

PROJECT TRAFFIC ANALYSIS REPORT

Florida Department of Transportation

District Seven

Branch Forbes Road Project Development & Environment (PD&E) Study

South of US 92 to North of I-4

Hillsborough County, Florida

Financial Management Number: 447159-1

ETDM Number: 14470

Date: December 2022

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022, and executed by FHWA and FDOT.



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Branch Forbes Road
South of US 92 to North of I-4
Project Development & Environment (PD&E) Study

Draft
Project Traffic Analysis Report

Work Program Item Segment No. 447159-1
Federal Project No. D721 009 B
ETDM Project No. 14470
Hillsborough County, Florida

Prepared for:



Florida Department of Transportation
District Seven

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December 2022

Traffic forecast for the project was developed using:	
☒ Travel Demand Model	☐ Growth Rates
Type of Travel Demand Model Used: ☒ Metropolitan Planning Model ☐ Other Model TBRPM v9.1	<i>Refer to appropriate section of Project Traffic Analysis Report that discusses growth rates</i>
Is the travel demand model based on the latest adopted Long Range Transportation Plan?	
☒ YES	☐ NO
11/05/2019 Date when MPO adopted the latest Long Range Transportation Plan	Explain why?
2015 Base Year of Travel Demand Model	
2045 Horizon Year of Travel Demand Model	
Long Range Transportation Plan documentation is available at (provide web address): https://planhillborough.org/2045lrtp/	
Traffic Data and Factors	
Standard K = 9.0% D Factor = 56.0% T _{Daily} = 10.0%	Data Collection Year = 2020 Opening Year = 2025 Interim Year = N/A Design Year = 2045
Discuss any changes in land use, economics, population and employment data since the model was built N/A	
Traffic Analysis Assumptions	
Discuss study area, data calibration/validation parameters, analysis tools, analysis periods and MOEs The Design Year Annual Average Daily Traffic (AADT) were developed using a calculated growth rate from the results of the TBRPM v9.1. Existing Year (2020), Opening Year (2025) and Design Year (2045) operations were analyzed using Synchro v11.1 and Highway Capacity Manual (HCM) results were reported. Measures of Effectiveness (MOEs) of delay, queues, and LOS were reported.	

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) District 7 is conducting a Project Development and Environment (PD&E) study along Branch Forbes Road from south of US 92 to north of Interstate 4 (I-4), in Hillsborough County. The study focuses on widening this section of Branch Forbes Road from a two-lane undivided facility to a four-lane divided facility and includes pedestrian and bicycle accommodations. The study also evaluates issues related to traffic operations, safety, access management and freight movements. The project will improve congestion and safety along this segment of Branch Forbes Road and continue to improve system linkage for this area. Operational improvements are also being evaluated for the I-4 interchange.

The PD&E study objectives include: determine proposed typical sections and develop preliminary conceptual design plans for proposed improvements, while minimizing impacts to the environment; consider agency and public comments; and ensure project compliance with all applicable federal and state laws. A Type 2 Categorical Exclusion is the class of action for this study. The proposed improvements include construction of stormwater management facility (SMF) and floodplain compensation (FPC) sites. The PD&E study satisfies all applicable requirements, including the National Environmental Policy Act (NEPA), to qualify for federal-aid funding of subsequent development phases (design, right of way acquisition, and construction).

The purpose of this Project Traffic Analysis Report (PTAR) is to provide FDOT District Seven the necessary traffic data and operational analysis to conduct the environmental evaluations needed for the recommended improvements along Branch Forbes study area. The following intersections were evaluated along Branch Forbes Road:

- Harvey Tew Road
- I-4 westbound ramp terminal
- I-4 eastbound ramp terminal
- Glenn Harwell Road/Beauchamp Road
- US 92

Existing conditions evaluations show the I-4 westbound (WB) off-ramp operating at Level of Service (LOS) F during both peak hours and operating with excessive delays. The AM peak hour results also show the US 92 intersection operating at LOS F. The PM peak hour results also show the I-4 eastbound (EB) off-ramp operating at LOS F with long delays and the US 92 intersection operating at LOS E with some of the movements experiencing long delays. The westbound through/right and the southbound left turn movements queues exceed their storage lengths at the US 92 intersection. The southbound left turn queue impacts the southbound through movement on Branch Forbes Road during both peak hours.

The following improvements were evaluated under the Build Alternative:

- Widening of Branch Forbes Road from a two-lane undivided roadway to a four-lane divided roadway from south of the US 92 intersection to north of the Harvey Tew Road intersection.
- Tight Urban Diamond Interchange (TUDI) with the following improvements:
 - At the I-4 westbound ramp terminal intersection:
 - Dual northbound left turn lanes extending south to north of the Glen Harwell Road/Beauchamp Road intersection
 - Adding an additional 500-foot (ft) left turn lane creating dual left turn lanes
 - At the I-4 eastbound ramp terminal intersection:
 - Adding an additional I-4 eastbound right turn lane to create dual right turn lanes
- Access management improvements at the Glen Harwell Road/Beauchamp Road intersection
- At US 92 intersection:
 - An additional through lane in the eastbound and westbound directions
 - An additional westbound right turn lane
 - An additional southbound left turn lane
 - Extending the eastbound left turn storage length to 475 ft and the westbound left turn storage length to 325 ft

As shown in **Table E-1**, the Build Alternative improves the intersection delays compared to the No-Build Alternative. **Table E-2** shows the arterial LOS results of the No-Build and Build Alternatives. The widening of Branch Forbes Road will improve the capacity, operations, and safety along Branch Forbes Road and improve connectivity between I-4 and US 92.

The intersection of Keene Road was added to the Build intersection analysis as part of the access management improvement at the Glen Harwell Road/Beauchamp Road. The analysis emphasis was on estimating the storage length needed for the southbound U-turn movement that is re-routed from Glen Harwell Road. Additional access management improvements will be evaluated in the PD&E Study and coordinated with Hillsborough County.

Table E-1 Design Year (2045) Intersection Analysis Summary

Intersection	No-Build (2045) Intersection Results				Build (2045) Intersection Results			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Harvey Tew Road*	891.7	F	186.0	F	337.5	F	82.7	F
I-4 WB Ramps	152.3	F	77.5	E	36.0	D	31.2	C
I-4 EB Ramps	59.3	E	43.2	D	22.3	C	26.6	C
Glen Harwell Road/ Beauchamp Road*	Err	**	Err	**	28.0	D	32.4	D
Keene Drive	--	--	--	--	388.3	F	7074.4	F
US 92	118.4	F	120.3	F	130.2	F	63.9	E

*Represents highest movement delay for the unsignalized intersection.

**No results provided, or computations not completed. Delay threshold is exceeded.

Table E-2 Design Year (2045) Arterial LOS Results

Cross Street along Branch Forbes Road	No-Build (2045)				Build (2045)			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS
Northbound Direction								
US 92	3.6	F	6.4	F	1.4	F	4.8	F
I-4 EB On-ramp	3.7	F	3.9	F	21.3	D	19.2	D
I-4 WB On-ramp	18.6	D	10.6	F	24.2	C	19.8	D
Total	4.3	F	5.1	F	4.2	F	10.3	F
Southbound Direction								
I-4 WB On-ramp	3.9	F	11.6	F	14.0	E	16.4	E
I-4 EB On-ramp	26.4	C	20.7	D	21.1	D	15.5	E
US 92	18.0	D	14.2	E	19.6	D	18.2	D
Total	7.6	F	13.6	E	17.1	D	17.0	D

Additional improvements were evaluated at the US 92 at Branch Forbes Road intersection to improve the intersection operations for design year: an additional northbound through lane (550 feet long) and an additional eastbound left turn lane. **Tables E-3** show the intersection operational results with the additional improvements at the US 92 intersection and **Table E-4** shows the arterial LOS results. The US 92 intersection is expected to operate at LOS E in the AM peak hour, but the intersection delay is reduced by 50% when compared to the No-Build Alternative. During the PM peak hour, the intersection LOS improves from F to D.

Table E-3 Design Year (2045) Intersection Analysis Summary with Additional US 92 Intersection Improvements

Intersection	No-Build (2045) Intersection Results				Build (2045) Intersection Results			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Harvey Tew Road*	891.7	F	186.0	F	337.5	F	82.7	F
I-4 WB Ramps	152.3	F	77.5	E	36.8	D	31.8	C
I-4 EB Ramps	59.3	E	43.2	D	22.6	C	28.0	C
Glen Harwell Road/ Beauchamp Road*	Err	**	Err	**	28.0	D	32.4	D
Keene Drive	--	--	--	--	388.3	F	7074.4	F
US 92	118.4	F	120.3	F	58.6	E	49.7	D

*Represents highest movement delay for the unsignalized intersection.

**No results provided, or computations not completed. Delay threshold is exceeded.

Table E-4 Design Year (2045) Arterial LOS Results with Additional US 92 Intersection Improvements

Cross Street along Branch Forbes Road	No-Build (2045)				Build (2045)			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS
Northbound Direction								
US 92	3.6	F	6.4	F	5.6	F	6.8	F
I-4 EB On-ramp	3.7	F	3.9	F	21.0	D	19.3	D
I-4 WB On-ramp	18.6	D	10.6	F	23.5	C	19.0	D
Total	4.3	F	5.1	F	11.8	F	12.6	F
Southbound Direction								
I-4 WB On-ramp	3.9	F	11.6	F	14.1	E	16.4	E
I-4 EB On-ramp	26.4	C	20.7	D	21.3	D	14.8	E
US 92	18.0	D	14.2	E	19.3	D	18.9	D
Total	7.6	F	13.6	E	17.1	D	17.2	D

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Glossary of Terms

Term	Definition
AADT	Annual Average Daily Traffic
D	Directional Factor
DDI	Diverging Diamond Interchange
DHT	Design Hour Trucks
DDHV	Directional Design Hour Volumes
DHV	Design Hour Volumes
ETAT	Environmental Technical Advisory Team
ETDM	Efficient Transportation Decision Making
FDEM	Florida Division of Emergency Management
FDOT	Florida Department of Transportation
FPC	Floodplain Compensation
FTO	Florida Traffic Online
HCM	Highway Capacity Manual
IOAR	Interchange Operational Analysis Report
K	Design Hour Traffic Factor
LOS	Level of Service
MOCF	Model Output Conversion Factor
mph	Miles per Hour
MVMT	Million Vehicle Miles Traveled
NEPA	National Environmental Policy Act
OEM	Office of Environmental Management
PD&E	Project Development and Environment
PSWADT	Peak Season Weekday Average Daily Traffic
PTAR	Project Traffic Analysis Report
ROW	Right of Way
SIS	Strategic Intermodal System
SMF	Stormwater Management Facility
SSOGis	State Safety Office Geographic Information System
TBRPM	Tampa Bay Regional Planning Model
TUDI	Tight Urban Diamond Interchange
TMC	Turning Movement Counts
TWSC	Two Way Stop Control

SECTION 1 INTRODUCTION

1.1 PD&E STUDY PURPOSE

The objective of the Project Development and Environment (PD&E) study is to assist the Florida Department of Transportation (FDOT) Office of Environmental Management (OEM) in reaching a decision on the type, location, and conceptual design of the proposed improvements for the widening of Branch Forbes Road from south of US 92 to north of I-4 and operational improvements at the I-4 interchange, including stormwater management facility (SMF) and floodplain compensation (FPC) sites. This study documents the need for the improvements as well as the procedures utilized to develop and evaluate various improvements, including elements such as proposed typical sections, preliminary horizontal alignments, intersection enhancement alternatives, and interchange operational improvements.

The PD&E study satisfies all applicable requirements, including the National Environmental Policy Act (NEPA), to qualify for federal-aid funding of subsequent development phases [design, right of way (ROW) acquisition, and construction]. This project was screened through the FDOT's Efficient Transportation Decision Making (ETDM) process as ETDM Project No. 14470. The ETDM Programming Screen Summary Report was published on September 23, 2021, containing comments from the Environmental Technical Advisory Team (ETAT) on the project's effects on various natural, physical, and social resources. A Type 2 Categorical Exclusion is the Class of Action for this PD&E study.

1.2 PROJECT PURPOSE AND NEED

1.2.1 Purpose

The purpose of the project is to address capacity needs as well as to improve safety conditions within the project area.

1.2.2 Need

The project is needed to improve capacity, safety and system linkage.

1.2.3 Transportation Demand/Capacity

Branch Forbes Road currently operates at an unacceptable Level of Service (LOS) F and is forecasted to continue to operate at LOS F in 2045 without any capacity or operational improvements. The Existing Year (2020) Annual Average Daily Traffic (AADT) for Branch Forbes is 22,000 exceeding the 14,800 AADT Level of Service (LOS) D for two-lane undivided arterials with a 35 miles per hour (mph) posted speed limit when compared to Table 1 of the FDOT Generalized Tables.

1.2.4 Safety

Between 2015 and 2019 the total number of crashes on Branch Forbes Road within the project area was 183. The historic average crash rate (5.12 crashes per million vehicle miles traveled or MVMT) for

this segment of Branch Forbes Road is considerably higher than the statewide average (0.69 MVT) for similar facility types. This high comparative crash rate is likely due to the on- and off-ramps for I-4 which intersect Branch Forbes Road and the US 92 intersection along the project segment which creates multiple conflict points for vehicles entering and exiting within the area. Rear-end crashes were the predominant crash type, followed by angle crashes, representing 75% of the total number of crashes.

1.2.5 System Linkage

The project is needed to support area connectivity between US 92 and I-4, which are both Florida Division of Emergency Management (FDEM) designated evacuation routes that have high volumes of trucks. US 92 is major east-west facility that spans the entire state and provides relief for I-4, a Strategic Intermodal System (SIS) facility, during major traffic incidents. US 92 is also an important freight route in Hillsborough County.

1.3 PROJECT DESCRIPTION

The project will reconstruct Branch Forbes Road to widen the roadway to accommodate future capacity and multimodal needs including bike lanes and sidewalks along Branch Forbes Road from south of US 92 to north of I-4, a distance of approximately 0.89 miles in Hillsborough County, Florida. A project location map is provided as **Figure 1-1**. The project also includes safety and operational improvements at the I-4 interchange and evaluation of SMF and FPC sites.

1.4 PREVIOUS STUDIES

FDOT District Seven conducted an Interstate 4 (I-4) Interchange Needs Evaluation Study in 2018 to evaluate current traffic operations and identify operational deficiencies at the interchanges along I-4 from east of I-75 to the western connection of SR 570 (Polk Parkway). The study's primary goal was to identify problems at the interchanges off-ramps that cause safety and operational issues on the I-4 mainline. Proposed recommendations focused on small scale, cost feasible projects that can be funded through current FDOT programs. The I-4 Interchange Needs Evaluation Study was conducted concurrently with the I-4 Project Development and Environment (PD&E) Study from east of 50th Street to the Polk Parkway (Work Program Item Segment Number 431746-1). The I-4 Interchange Needs Evaluation Study also recommended long-term improvements to accommodate the expected growth in the Dover and Plant City areas in Hillsborough County. The short-term and long-term recommendations for Branch Forbes Road included:

- Short-term recommendations
 - Installing a traffic signal at both I-4 eastbound and westbound ramp termini intersections
 - Extending the northbound and southbound left turn storage length at both eastbound and westbound I-4 ramp termini
 - Adding an 840-foot right turn lane at the eastbound off-ramp

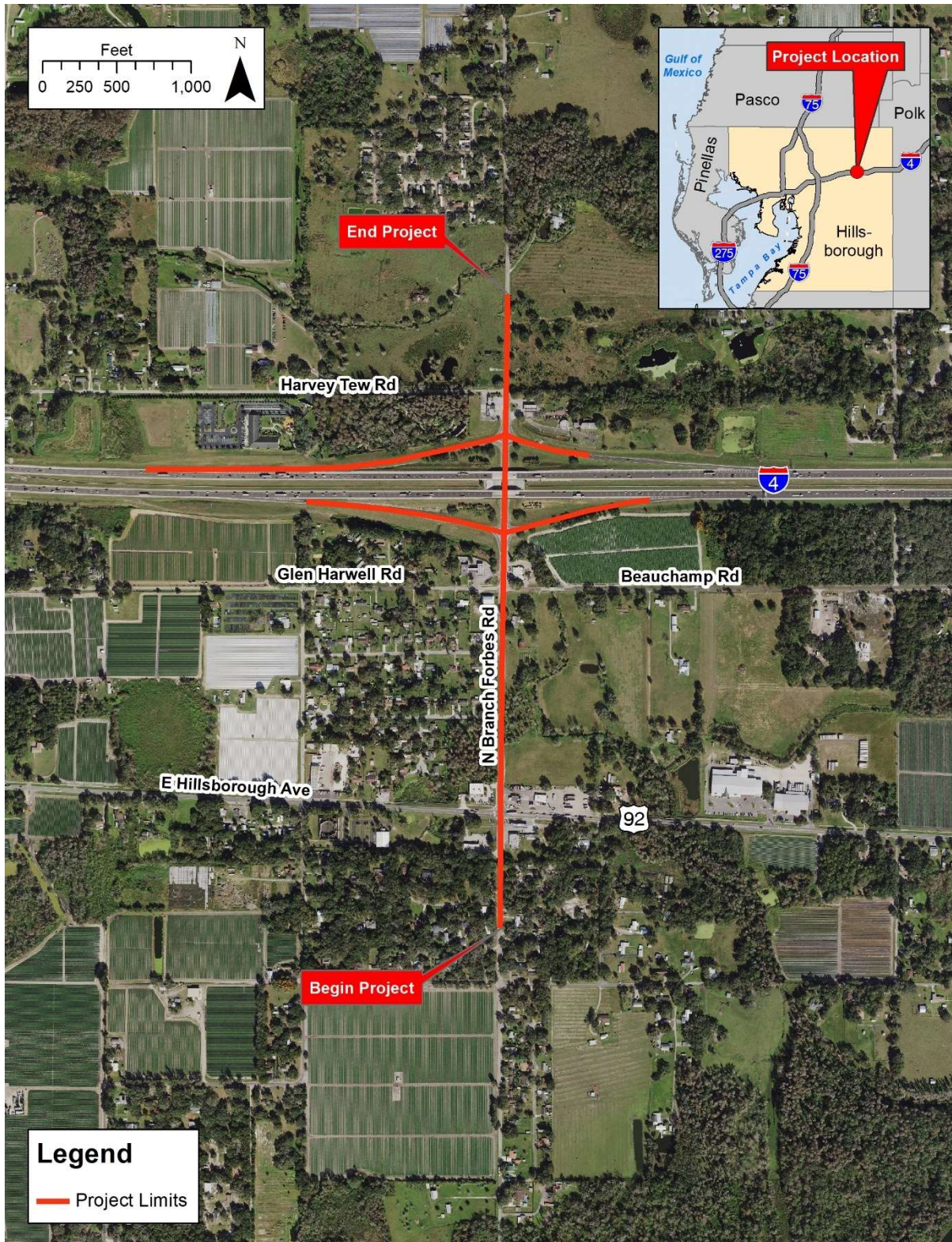


Figure 1-1 Project Location Map

- Long-term recommendations:
 - Widen Branch Forbes Road from two to four lanes from US 92 to north of I-4
 - Add a second northbound to westbound left turn lane and a second westbound to southbound left-turn lane at the I-4 westbound ramp termini intersection
 - Add a second receiving lane at the I-4 westbound on-ramp

An Interchange Operational Analysis Report (IOAR) was approved in June 2021 by FDOT Central Office (CO) for the I-4 at Branch Forbes Road interchange which included the short-term recommendations listed in the I-4 Interchange Needs Evaluation Study. The short-term improvements are currently under design and construction is scheduled for Fiscal Year 2024.

A Design Traffic Technical Memorandum was conducted in May 2017 for the US 92 PD&E Study from east of I-4 to east of County Line Road. The PD&E Study recommended the widening of US 92 from two lanes to four lanes with additional intersection improvements from east of I-4 to east of County Line Road except for the area that currently goes through Downtown Plant City which is currently a two-lane one-way pair section. The recommended additional intersection improvements at US 92 at Branch Forbes Road included: and additional southbound left turn lane and a westbound right turn lane.

An interchange evaluation was performed for the I-4 at Branch Forbes Road interchange on June 2022 to evaluate the interchange operations with a tight urban diamond interchange (TUDI) configuration and a diverging diamond interchange (DDI) configuration. After evaluating concepts, right-of-way, and costs, FDOT decided on the TUDI configuration for the interstate. The TUDI configuration will be included in the Build Alternative evaluation on this Project Traffic Analysis Report (PTAR).

1.5 EXISTING FACILITY AND PROPOSED IMPROVEMENTS

1.5.1 Existing Facility

Branch Forbes Road is owned and maintained by Hillsborough County, with the exception of the I-4 interchange and limited access right-of-way (ROW) from Glen Harwell Road to Harvey Tew Road which is maintained by FDOT. Within the project area, Branch Forbes Road is currently a two-lane undivided facility functionally classified as an Urban Major Collector and has a posted speed limit of 35 mph along the majority of the project and 45 mph at the southern and northern termini. The existing lanes widths vary from 10-foot to 11-foot along the corridor, and there are no paved shoulders with approximately 2-feet to 5-feet unpaved shoulders. The existing Branch Forbes Road within the project limits has no bicycle lanes, sidewalks or other facilities for pedestrians and bicyclists, with the exception of two small segments of sidewalk on the west side of Branch Forbes Road, one north of the US 92 intersection and the other south of I-4. The existing typical section is provided as **Figure 1-2**.

1.5.2 Proposed Improvements

The proposed typical section includes a four-lane divided facility with a 22-foot median and curb and gutter. There will be two 11-foot travel lanes in each direction with 5-foot to 7-foot wide bicycle lanes and a 6-foot wide sidewalk on both sides of the road. The proposed ROW will vary along the corridor but will be a minimum of 106 foot. The proposed typical section is provided below as **Figure 1-3**. Operational improvements are also proposed for the I-4 interchange. The improvements include signalizing the ramp intersections, adding turn lanes, modifying access management, and providing other safety and operational enhancements. No improvements to the I-4 mainline are included as part of this study.

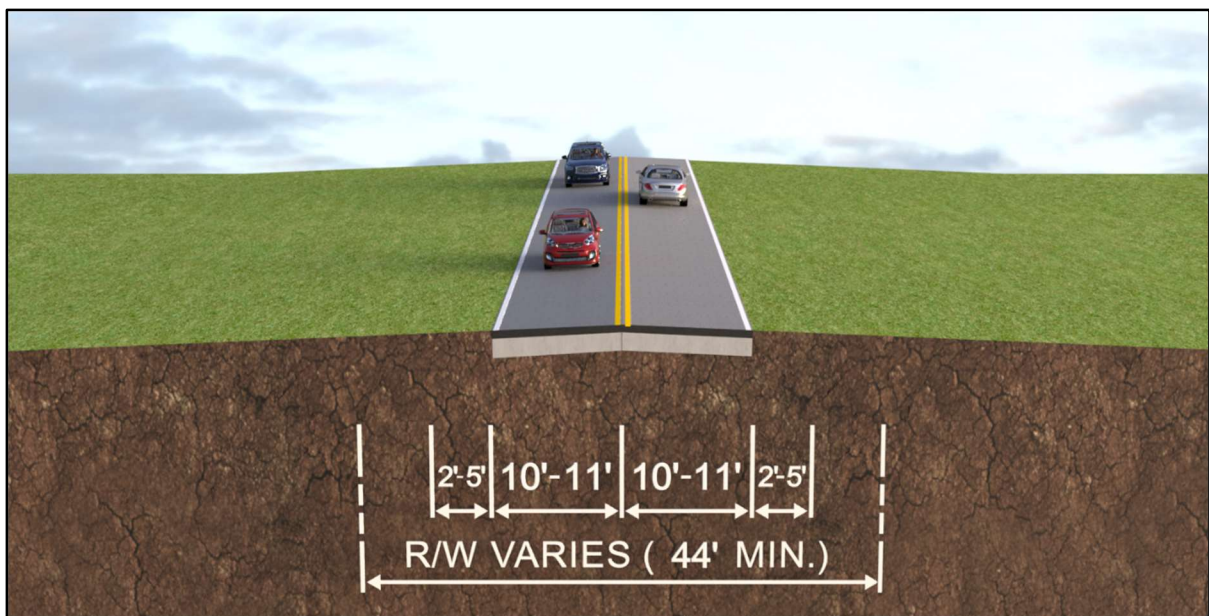


Figure 1-2 Branch Forbes Road - Existing Typical Section

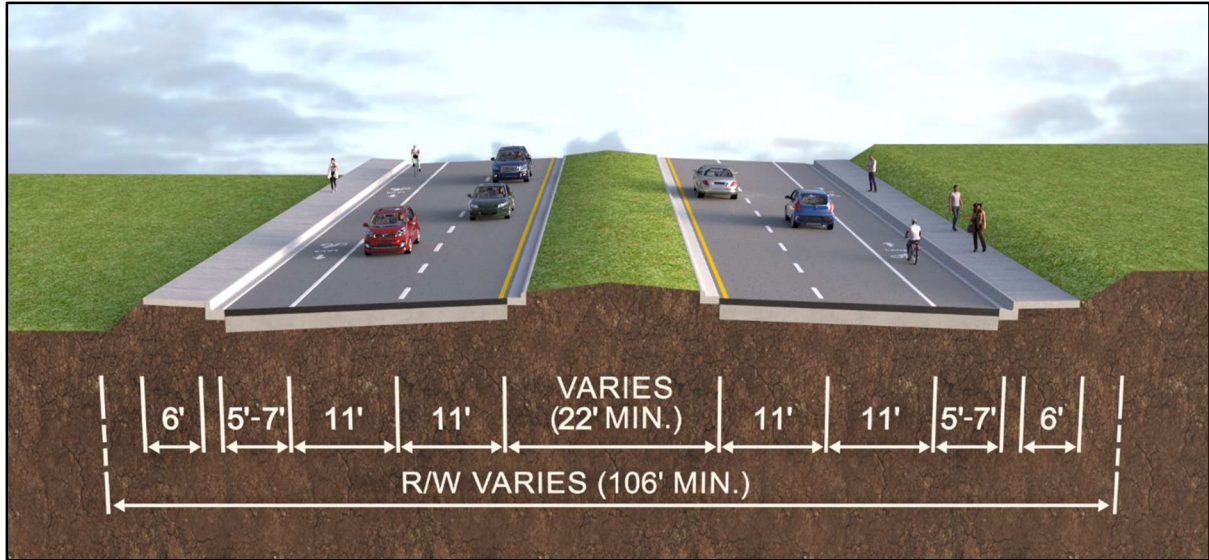


Figure 1-3 Branch Forbes Road - Proposed Typical Section

1.6 REPORT PURPOSE

The purpose of this PTAR is to provide FDOT District Seven the necessary traffic data and operational analysis to conduct the engineering and environmental evaluations needed for the recommended improvements along the Branch Forbes Road study area. This PTAR was conducted in accordance with *FDOT PD&E Manual Part 2, Chapter 2* (effective July 1, 2020).

SECTION 2 STUDY METHODOLOGY

The following study methodology was submitted to FDOT District Seven on July 5, 2022, and was approved on July 8, 2022. The approved methodology is included in **Appendix A**.

- Summarize data and improvements at the US 92 at Branch Forbes Road intersection.
- Traffic data from the I-4 at Branch Forbes Road IOAR was used.
- The years of analysis for this study are:
 - Existing Year – 2020
 - Opening Year – 2025
 - Design Year – 2045
- Evaluation of existing conditions was performed using Synchro 11 and the Highway Capacity Manual (HCM) 6th Edition results were reported.
- The travel demand forecasting procedure from the I-4 at Branch Forbes Road IOAR will be summarized.
- Future conditions traffic analyses were performed for No-Build conditions and Build Alternative using Synchro 11 and HCM 6th Edition results were reported. If HCM 6th Edition results could not be provided, then HCM 2000 results were reported.
- No-Build Alternative Analysis:
 - Opening Year 2025: Includes the interchange improvements identified in the Branch Forbes Road IOAR.
 - Design Year 2045: Includes the interchange improvements identified in the Branch Forbes Road IOAR plus US 92 intersection improvements identified in the US 92 PD&E Study.
 - Build Alternative analysis for both Opening Year 2025 and Design Year 2045 includes:
 - TUDI alternative
 - Widening of Branch Forbes Road from two to four lanes from US 92 to north of I-4
 - US 92 intersection improvements identified in the US 92 PD&E Study
- Crash data from years 2015-2019 was summarized in the study.

SECTION 3 EXISTING CONDITIONS ANALYSIS

The analyzed intersections in the study area are:

- Harvey Tew Road (unsignalized)
- I-4 westbound ramp termini (unsignalized)
- I-4 eastbound ramp termini (unsignalized)
- Glen Harwell Road/Beauchamp Road (unsignalized)
- US 92 (signalized)

Figure 3-1 shows the existing geometry and traffic control features of the intersections in the study area.

3.1 ANNUAL AVERAGE DAILY TRAFFIC VOLUMES

As mentioned in Section 2.0, the traffic data for this PTAR was taken from the approved I-4 at Branch Forbes Road IOAR dated June 2021. The approved traffic data from the IOAR is included in **Appendix B**. The Existing Year (2020) AADT volumes are summarized on **Table 3-1** and shown graphically in **Figure 3-2**.

Table 3-1 Existing Year (2020) AADTs

Location	2020 AADT
I-4 EB Off-ramp	5,800
I-4 EB On-ramp	4,400
I-4 WB Off-ramp	4,500
I-4 WB On-ramp	6,800
Branch Forbes Road north of Harvey Tew Road	7,300
Harvey Tew Road west of Branch Forbes Road	1,000
Branch Forbes Road north of I-4	8,900
Branch Forbes Road south of I-4	22,000
Beauchamp Road east of Branch Forbes Road	1,100
Glen Harwell Road west of Branch Forbes Road	1,700
Branch Forbes Road north of US 92	18,500
Branch Forbes Road south of US 92	8,500
US 92 east of Branch Forbes Road	16,500
US 92 west of Branch Forbes Road	11,000

3.2 TRAFFIC FACTORS

The K and D factors are the percentage of daily traffic volumes occurring during the peak hour and the proportion of traffic traveling in the peak direction, respectively. A Standard K factor of 9.0% and a D factor of 56% were used in this study. A D-factor of 65% was used on Branch Forbes Road north of the Harvey Tew Road intersection based on the turning movement counts.

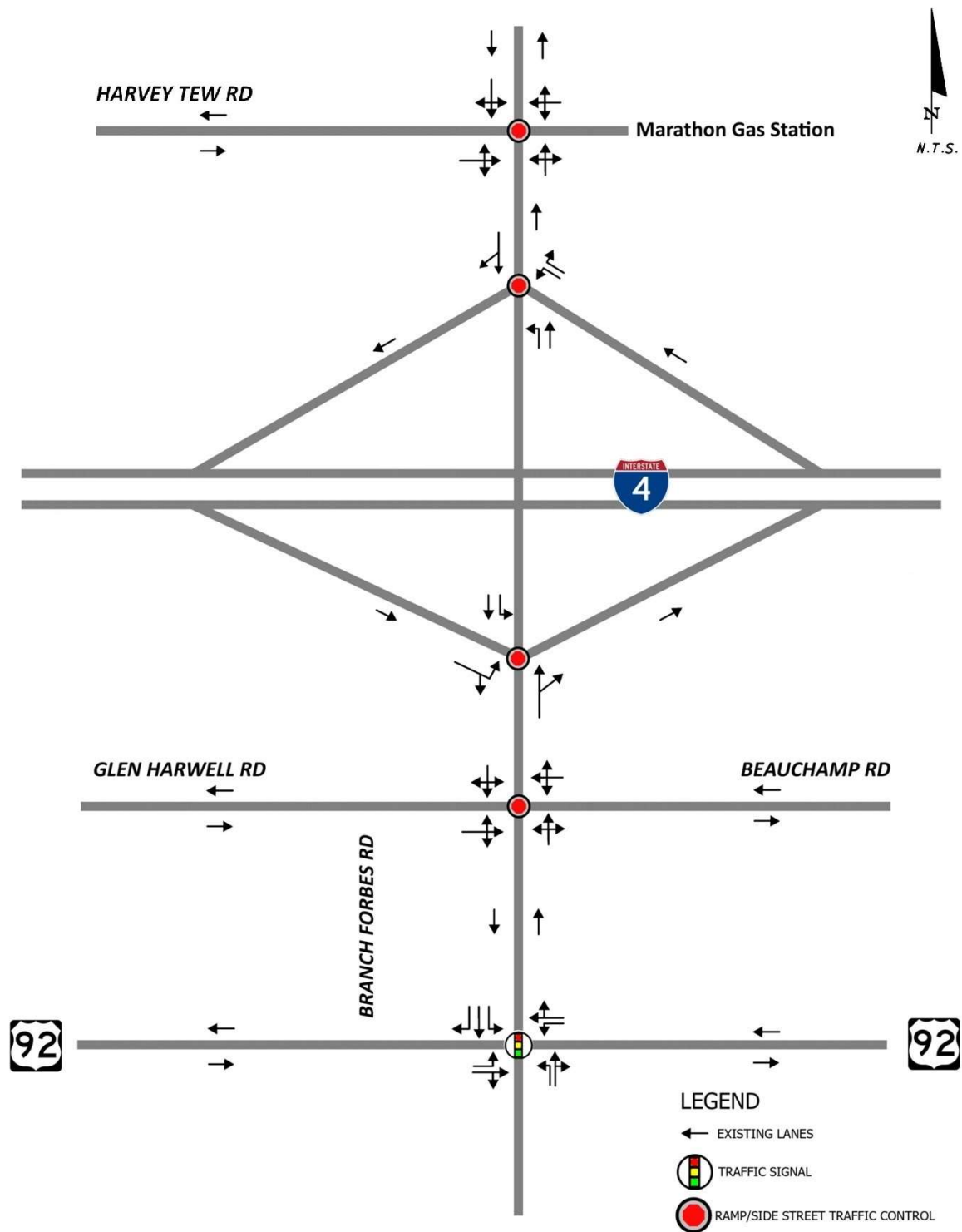


Figure 3-1 Existing Geometry



Design Hour Trucks (DHT) is the percentage of daily truck traffic during the design hour. A DHT of 5.0% was used in the report based on historical truck percentage at the I-4 ramps. The traffic factors are shown in **Table 3-2** and were taken from the approved I-4 at Branch Forbes Road IOAR.

Table 3-2 Traffic Factors

K Factor (%)	D-Factor (%)	DHT (%)
9.0	56.0	5.0

3.3 TURNING MOVEMENT VOLUMES

The K and D factors were applied to the 2020 AADTs to obtain the directional design hour volumes (DDHV). The intersection turning volumes were determined by applying turning movement percentages derived from existing turning movement counts (TMCs) to the segment DDHVs. Once the segment DDHVs and intersection turning movements were calculated, the existing design hour traffic volumes were subsequently adjusted and balanced through the system. Turning movement volumes for the Marathon Gas Station driveway were taken from the TMCs.

The Existing Year 2020 AM and PM peak hours turning movement volumes are shown on **Figure 3-3**.

3.4 EXISTING (2020) OPERATIONAL ANALYSIS

There are four unsignalized intersections and one signalized intersection along Branch Forbes Road within the study area. An analysis of the existing signalized intersections was performed using existing signal phasing/timing information obtained from Hillsborough County. The intersections operations were analyzed using Synchro v11.1 and the Highway Capacity Manual (HCM), 6th Edition results are summarized in **Tables 3-3 and 3-4**. A target LOS of D is established for the study area. The key measures of effectiveness are 95th percentile queue length and delay for overall intersection and individual movements.

Table 3-3 shows the delay and LOS for the existing conditions during the AM and PM peak hours. **Table 3-4** shows the vehicle queue results for the intersection movements. The storage length for some of the movements was taken as the distance from the intersection to the nearest upstream access point.

Table 3-3 shows the I-4 WB off-ramp operating at LOS F during both peak hours operating with excessive delays. The AM peak hour results also show the US 92 intersection operating at LOS F. The PM peak hour results also show the I-4 EB off-ramp operating at LOS F with long delays and the US 92 intersection operating at LOS E with some of the movements experiencing long delays. The queues that exceed the storage length for that movement are shown in bold and highlighted in yellow in **Table 3-4**. **Table 3-4** shows the westbound through/right and the southbound left movements queues exceeding their storage lengths at the US 92 intersection. The southbound left turn queue impacts the southbound through movement on Branch Forbes Road during both peak hours.

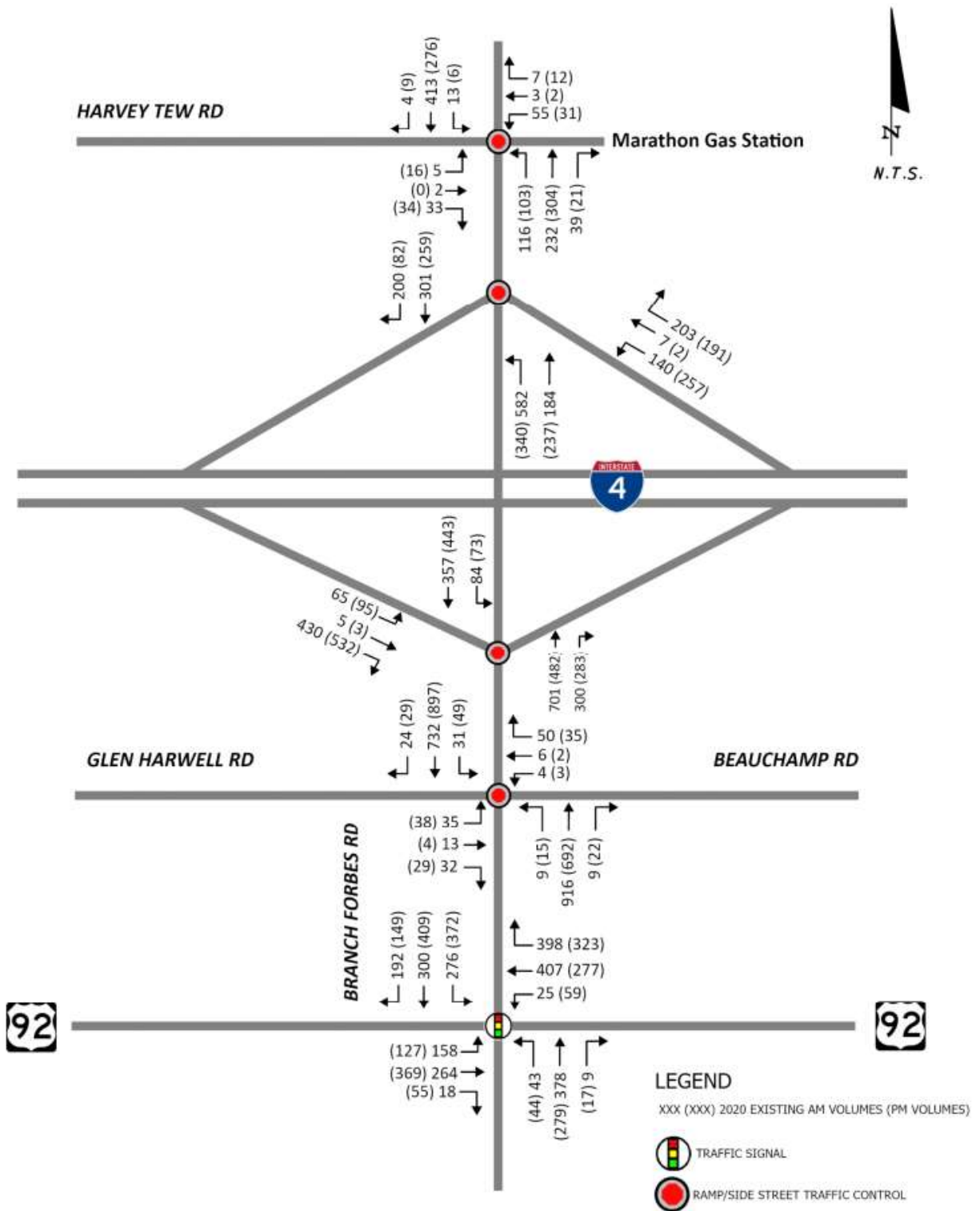


Figure 3-3 Existing Year (2020) Turning Movement Volumes

Table 3-3 Existing Year (2020) Intersection Delay and LOS Results

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Branch Forbes Road at Harvey Tew Road*							
Eastbound	Left/Thru/Right	13.8	B	B	14.2	B	B
Westbound	Left/Thru/Right	31.7	D	D	20.2	C	C
Northbound	Left	8.7	A		8.2	A	
Southbound	Left	7.9	A		8.0	A	
Intersection: Branch Forbes Road at I-4 WB Ramps*							
Westbound	Left/Thru	1213.4	F	F	524.5	F	F
	Right	10.7	B		11.2	B	
Northbound	Left	10.8	B		8.9	A	
Intersection: Branch Forbes Road at I-4 EB Ramps*							
Eastbound	Left/Thru/Right	19.0	C	C	119.6	F	F
Southbound	Left	9.7	A		8.7	A	
Intersection: Branch Forbes Road at Glen Harwell Road/Beauchamp Road*							
Eastbound	Left/Thru/Right	291.5	F	F	229.6	F	F
Westbound	Left/Thru/Right	39.1	E	E	26.3	D	D
Northbound	Left	9.5	A		10.3	B	
Southbound	Left	10.4	B		9.5	A	
Intersection: Branch Forbes Road at US 92							
Eastbound	Left	41.3	D	C	32.4	C	C
	Thru/Right	16.7	B		19.2	B	
Westbound	Left	23.2	C	F	26.8	C	F
	Thru/Right	286.0	F		117.0	F	
Northbound	Left	32.5	C	E	35.5	D	D
	Thru/Right	75.2	E		46.0	D	
Southbound	Left	195.9	F	F	203.7	F	F
	Through	25.3	C		28.1	C	
	Right	23.6	C		21.7	C	
Intersection			137.3	F	Intersection	76.6	E

*Per HCM 6th Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6th Edition does not calculate LOS for major street thru movements and approaches or for the intersection as a whole.

The Existing Year (2020) Synchro results and the US 92 and Branch Forbes Road signal timing information are included in **Appendix C**.

Table 3-4 Existing Year (2020) Intersection Vehicle Queues

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 th Percentile)		PM Peak Hour Queues (95 th Percentile)	
			Veh	Feet**	Veh	Feet**
Branch Forbes Road at Harvey Tew Road	EB Left/Thru/Right	1,000	0.3	8	0.4	10
	WB Left/Thru/Right	85	1.4	35	0.6	15
	NB Left	330	0.4	10	0.3	8
	SB Left	1,000	0.0	0	0.0	0
Branch Forbes Road at I-4 WB Ramps	WB Left/Thru	1,800	16.9	423	21.7	543
	WB Right	1,000	1.0	25	1.0	25
	NB Left	80	2.9	73	1.2	30
Branch Forbes Road at I-4 EB Ramps	EB Left/Thru/Right	1,700	5.5	138	23.0	575
	SB Left	100	0.3	8	0.2	5
Branch Forbes Road at Glen Harwell Road/Beauchamp Road	EB Left/Thru/Right	1,000	6.7	168	5.6	140
	WB Left/Thru/Right	1,000	1.6	40	0.7	18
	NB Left	430	0.0	0	0.1	3
	SB Left	380	0.1	3	0.2	5
Branch Forbes Road at US 92	EB Left	285	5.9	148	4.0	100
	EB Thru/Right	1,300	7.1	178	10.9	273
	WB Left	300	0.7	18	1.9	48
	WB Thru/Right	620	78.3	1,958	36.2	905
	NB Left	150	1.7	42	1.8	45
	NB Thru/Right	1,100	19.7	483	12.4	310
	SB Left	225	22.3	558	26.3	658
	SB Thru	650	9.7	243	13.2	330
	SB Right	160	6.3	158	4.6	115

*For ramps, the storage was determined as the length of the ramp or as the storage length when provided.

**Queue in feet estimated by multiplying the number of vehicles times 25 feet.

3.5 HISTORICAL CRASH ANALYSIS

A five-year historical crash analysis was performed according with Part 2, Chapter 2 of the FDOT PD&E Manual for years 2015-2019. Crash data for the I-4 ramps was obtained from the FDOT D7 Crash Data Management System, which pulls data from the FDOT Crash Analysis Reporting (CAR) Online, and crash data for Branch Forbes Road was obtained from FDOT State Safety Office Geographic Information System (SSOGis).

The Branch Forbes Road influence area for which crash data was analyzed includes the I-4 on/off ramps from/to Branch Forbes Road. The crash data for Branch Forbes Road includes 1,000 feet south of the US 92 intersection to 1,000 feet north of the Harvey Tew Road intersection. The crash data for US 92 includes 250 feet east and west of the Branch Forbes intersection. **Table 3-5** provides a

summary of the total crashes per year in the study area and the location of the crashes. **Table 3-6** provides a summary of the crash severity along the I-4 ramps, Branch Forbes Road, and US 92.

Table 3-5 Number of crashes

Year	Location			Total
	I-4 on/off ramps	Branch Forbes Road	US 92	
2015	21	13	17	51
2016	19	12	8	39
2017	16	11	19	46
2018	15	9	7	31
2019	6	0	10	16
Total	77	45	61	183

Table 3-6 Crash Summary

Location	Total Number of Crashes	Number of Fatal Crashes	Number of Fatalities	Number of Injury Crashes	Number of Injuries	Number of Property Damage Only (PDO) Crashes
I-4 on/off ramps	77	0	0	22	27	55
Branch Forbes Road	45	0	0	18	29	27
US 92	61	0	0	25	44	36
Total	183	0	0	65	100	118

As shown in **Tables 3-5 and Table 3-6**, 183 crashes occurred in the Branch Forbes Road study area, of which 65 were injury crashes, resulting in 100 injuries. 118 of crashes resulted in property damage only (PDO). There were no fatal crashes in the study area for the analyzed years. On average, the crash frequency for the Branch Forbes Road study area is 37 crashes per year.

Table 3-7 summarizes the types of crashes. The most predominant crash type for the study area is rear end with 81 crashes (44%). At the I-4 on/off ramps the predominant type of crash is rear end (68%). Along Branch Forbes Road, the most predominant type is angle (49%), and along US 92 the most predominant crash types are angle (48%) and rear end (33%).

Table 3-8 shows the common cause of crashes is operating a motor vehicle in a careless or negligent manner with 69 crashes (38%) followed by failed to yield the right-of-way with 57 crashes (31%). **Table 3-9** shows 127 of the crashes (69%) occurred at daylight, and **Table 3-10** shows 156 of the crashes (85%) occurred on dry pavement.

Table 3-7 Crash Type Summary

Type of Crash	Location			Total
	I-4 on/off ramps	Branch Forbes Road	US 92	
Rear End	52	9	20	81
Angle	6	22	29	57
Sideswipe	3	3	2	8
Head-on	0	3	2	5
Hit Fixed Object	5	0	0	5
Hit Non-Fixed Object	1	0	0	1
Single Vehicle	5	0	0	5
Bike	0	0	0	0
Run Off Road	1	0	0	1
Pedestrian	0	0	0	0
Right Turn	1	0	0	1
Left Turn	3	0	0	3
Unknown/Other	0	8	8	16
Total	77	45	61	183

Table 3-8 Cause of Crashes

Cause of Crash	Location			Total
	I-4 on/off ramps	Branch Forbes Road	US 92	
Failed to Keep in Proper Lane	1	1	2	4
Followed too Closely	3	4	1	8
Failed to Yield Right-of-Way	11	22	24	57
No Contributing Action	5	2	2	9
Other Contributing Actions	2	2	1	5
Improper Turn	0	1	0	1
Operated MV* in Careless or Negligent Manner	47	4	18	69
Drove Too Fast for Conditions	3	2	0	5
Ran off Roadway	0	0	0	0
Over-Correcting/Over-Steering	2	0	0	2
Unknown	3	5	9	17
Improper Passing	0	0	1	1
Swerved or Avoided: Due to Wind, Slippery Surface, MV*, Object, Non-Motorist in Roadway, etc.	0	1	0	1
Operated MV* in Erratic, Reckless or Aggressive Manner	0	1	0	1
Ran Red Light	0	0	3	3
Total	77	45	61	183

*MV: Motor Vehicle

Table 3-9 Lighting Condition

Lighting Condition	Location			Total
	I-4 on/off ramps	Branch Forbes Road	US 92	
Daylight	55	33	39	127
Dark-Lighted	8	2	14	24
Dusk	6	2	1	9
Dark-Not Lighted	4	8	6	18
Dawn	4	0	1	5
Unknown	0	0	0	0
Total	77	45	61	183

Table 3-10 Pavement Condition

Pavement Condition	Location			Total
	I-4 on/off ramps	Branch Forbes Road	US 92	
Dry	63	38	55	156
Wet	14	7	6	27
Total	77	45	61	183

SECTION 4 TRAVEL DEMAND FORECASTING

The travel demand forecast was developed in accordance with the procedures in the 2019 FDOT Project Traffic Forecasting Handbook and documented in the I-4 at Branch Forbes Road IOAR as stated in Section 2.0. The travel demand forecasting is summarized in the following sections.

4.1 TRAVEL DEMAND MODEL VALIDATION

The Tampa Bay Regional Planning Model (TBRPM) Version 9.1 (v9.1) was the adopted travel demand model used for the I-4 at Branch Forbes Road IOAR. The TBRPM v9.1 is a time-of-day based four-step model with Base Year 2015 and Horizon Year (Cost Affordable Year) 2045.

Prior to utilizing the traffic assignment generated by a travel demand model for forecasting, a validation of the model should be performed to ascertain its ability to reasonably replicate travel demand in the study area.

The validation consisted of assessing the reasonableness of the TBRPM v9.1 Base Year 2015 highway assignment output by means of calculating model output-to-count ratios in those links where counts were available. To this end, the 2015 Peak Season Weekday Average Daily Traffic (PSWADT) volumes generated by the model were converted to 2015 AADT by applying the Model Output Conversion Factor (MOCF) obtained from Florida Traffic Online (FTO) Peak Season Factor Category Report. The model AADTs were then compared to 2015 AADTs volumes obtained from the I-4 Interchange Needs Evaluation Study from east of I-75 to the western connection of SR 570 (Polk Parkway) and FDOT's FTO.

The Cost Affordable Year 2045 model network was reviewed for consistency with planned projects in the study area.

The results of the validation revealed that the 2015 Base Year Model either under-assigned or over-assigned traffic on critical non-interstate links within the study area. Since the travel demand model did not reasonably replicate existing travel behavior on the non-interstate links within the study area, it was concluded that the application of off-model methods would be more appropriate to estimate the project future year traffic volumes.

Off-model methods refer to the analysis conducted to determine the growth rate of the corridor since the travel demand model did not reasonably replicate existing travel behavior and the analysis and methodology is explained in **Section 4.2**.

4.2 PROJECT TRAFFIC FORECAST

Design Year 2045 AADTs were developed by applying a growth rate to the Existing Year AADTs. Opening Year 2025 AADTs were then determined through interpolation of Existing Year and Design Year AADTs.

Traffic factors were applied to the future year AADTs to obtain Opening and Design Year segment design hour volumes (DHVs) and DDHVs. Lastly, the AM and PM peak hour intersection turning movement volumes for the future horizon years (i.e., 2025 and 2045) were determined by applying turning movement percentages derived from existing TMCs to the segment DDHVs.

4.2.1 Growth Rate Analysis

A robust analysis was undertaken to determine the appropriate growth rate for the corridor. The growth rate analysis included a detailed assessment of historical traffic growth trends, travel demand model highway assignment growth (TBRPM 2015/2045), and socio-economic growth (TBRPM 2015/2045). A compounded annual growth rate of 2.5% was recommended for the study area.

Table 4-1 and **Figure 4-1** show the projected Opening Year (2025) and Design Year (2045) AADTs. **Figure 4-2** shows the Opening Year (2025) turning movement volumes and **Figure 4-3** shows the Design Year (2045) turning movement volumes.

Table 4-1 Opening Year (2025) and Design Year (2045) AADTs

Location	Year 2020	Opening Year 2025	Opening Year 2025 Rounded	Design Year 2045	Design Year 2045 Rounded
I-4 EB Off-ramp	5,800	6,562	6,600	10,753	11,000
I-4 EB On-ramp	4,400	4,978	5,000	8,157	8,200
I-4 WB Off-ramp	4,500	5,091	5,100	8,343	8,300
I-4 WB On-ramp	6,800	7,694	7,700	12,607	12,500
Branch Forbes Road north of Harvey Tew Road	7,300	8,259	8,300	13,534	13,500
Harvey Tew Road west of Branch Forbes Road	1,000	1,131	1,100	1,854	1,900
Branch Forbes Road north of I-4	8,900	10,070	10,000	16,500	16,500
Branch Forbes Road south of I-4	22,000	24,891	25,000	40,787	41,000
Beauchamp Road east of Branch Forbes Road	1,100	1,245	1,200	2,039	2,000
Glen Harwell Road west of Branch Forbes Road	1,700	1,923	1,900	3,152	3,200
Branch Forbes Road north of US 92	18,500	20,931	21,000	34,298	34,500
Branch Forbes Road south of US 92	8,500	9,617	9,600	15,759	16,000
US 92 east of Branch Forbes Road	16,500	18,668	18,500	30,590	30,500
US 92 west of Branch Forbes Road	11,000	12,445	12,500	20,393	20,500

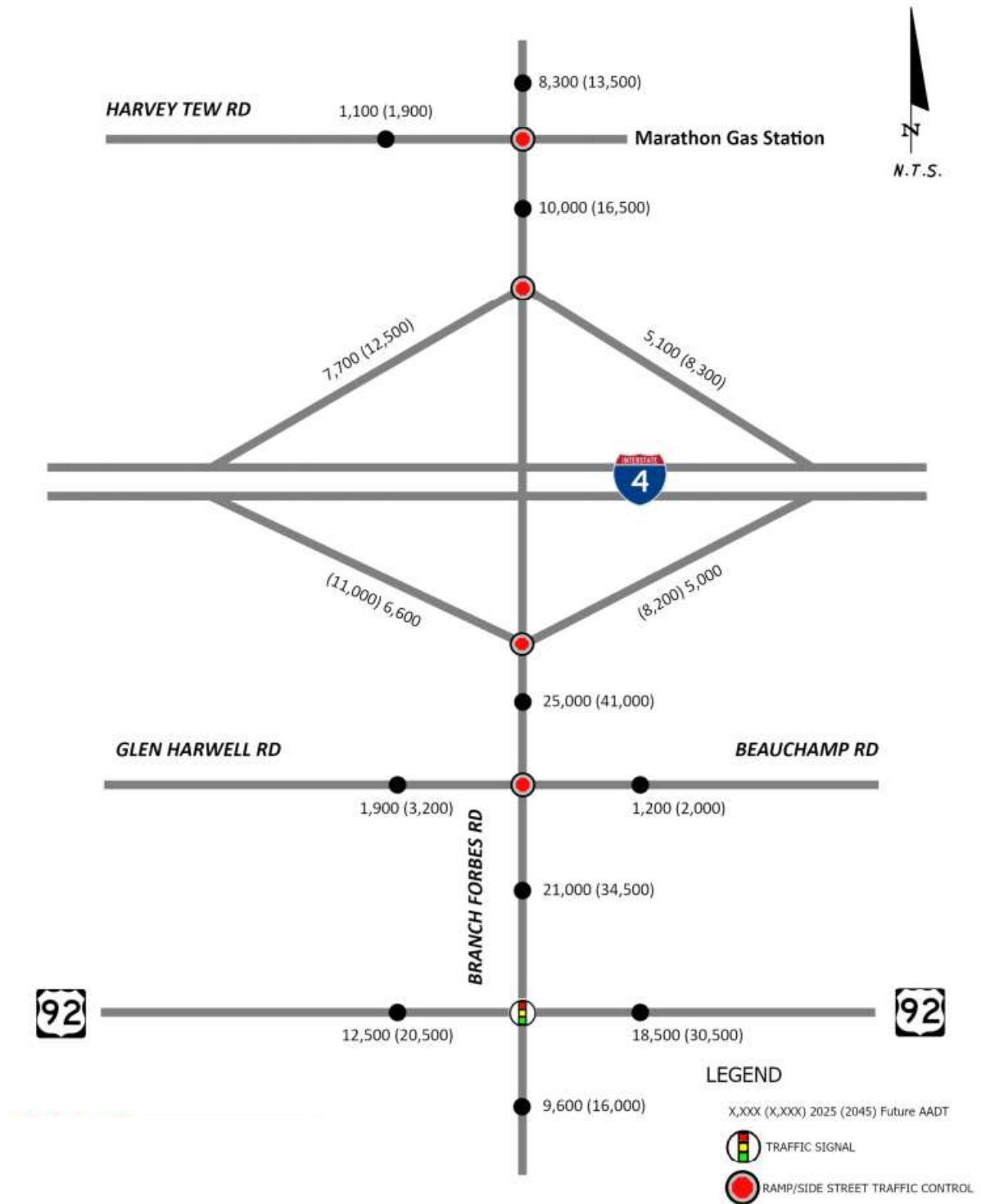


Figure 4-1 Opening Year (2025) and Design Year (2045) AADTs

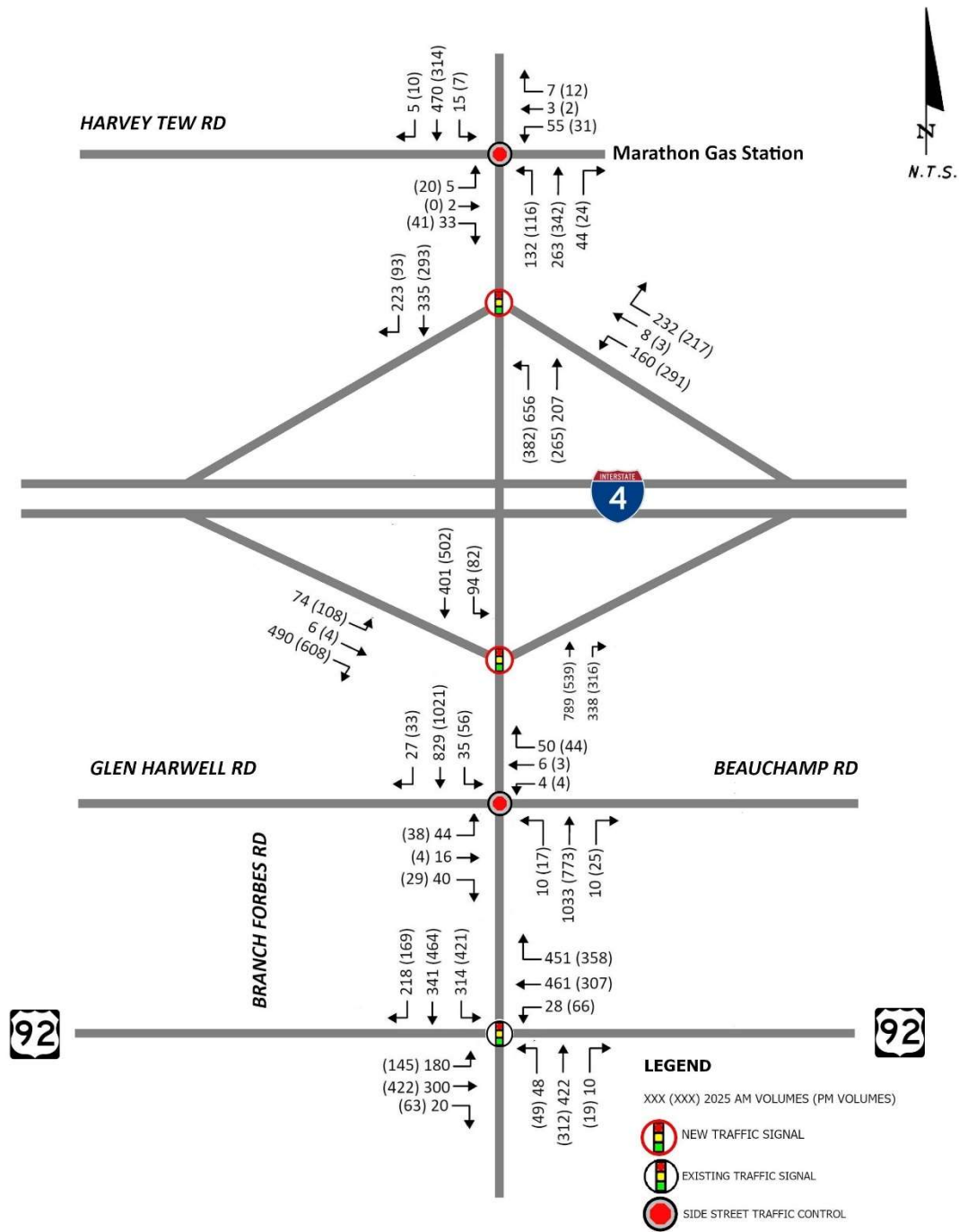


Figure 4-2 Opening Year (2025) Turning Movement Volumes

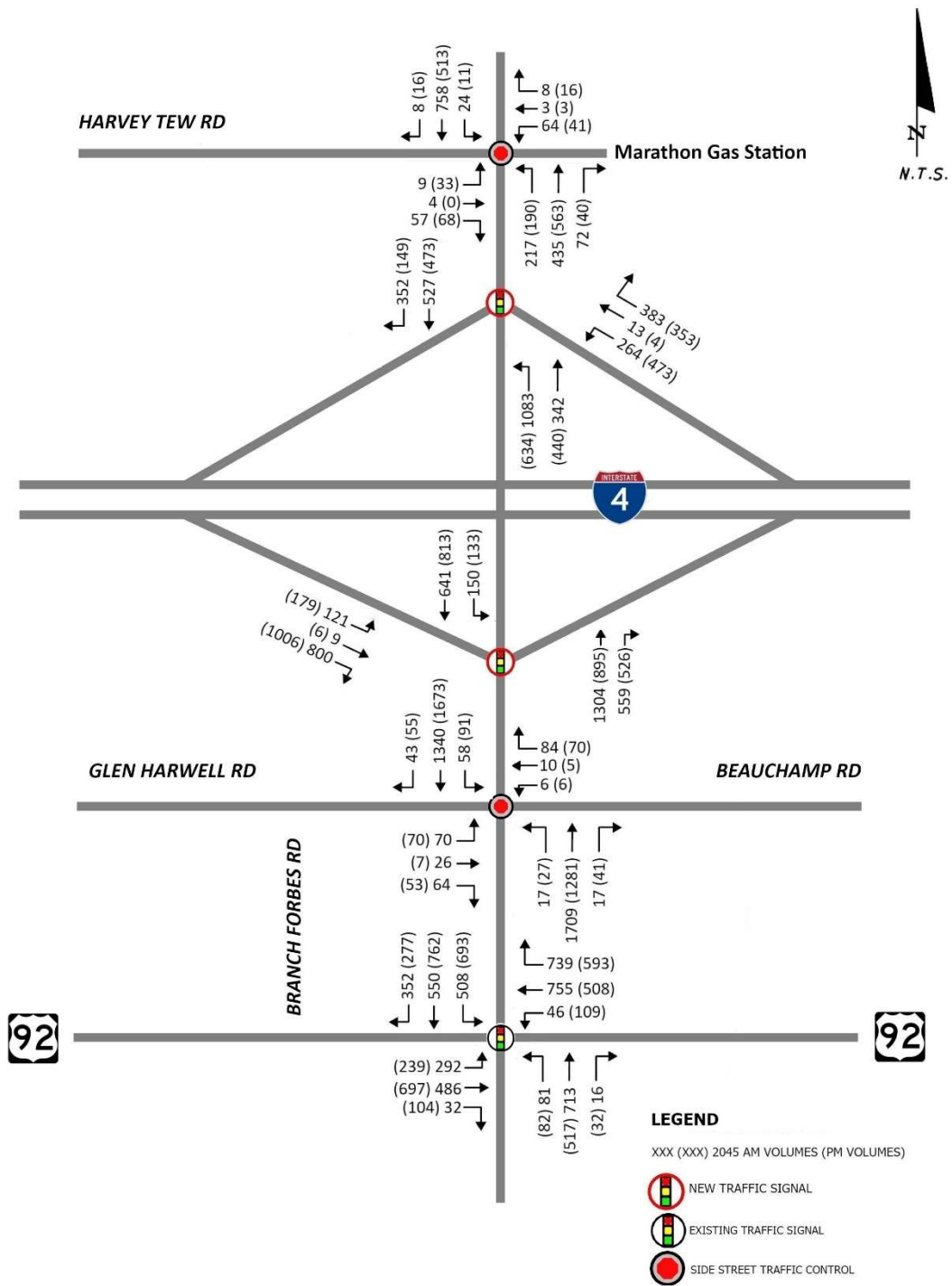


Figure 4-3 Design Year (2045) Turning Movement Volumes

SECTION 5 ALTERNATIVES ANALYSIS

The future traffic analysis was conducted for the following scenarios:

- No-Build Alternative
- Build Alternative

The No-Build Alternative and the Build Alternative were evaluated for Opening Year 2025 and Design Year 2045.

5.1 NO-BUILD ALTERNATIVE

The No-Build Alternative consists of the improvements identified in the I-4 at Branch Forbes IOAR that are currently under design and are schedule for construction in 2024. The No-Build Alternative for Design Year 2045 also includes the improvements identified in the US 92 PD&E Study. The following improvements are included in the No-Build Alternative:

- Opening Year 2025:
 - New Traffic Signals and Mast Arms at each of the I-4 and Branch Forbes Road ramp terminus.
 - Add new 840-foot right turn lane to existing I-4 EB off-ramp. Mill and resurface existing ramp.
 - Widen Branch Forbes Road to the outside between ramp terminals.
 - Extend existing northbound and southbound left turn lanes to provide minimum of 260-ft storage capacity at the I-4 ramp terminal intersections.
 - Add a southbound left turn lane at the intersection of Branch Forbes Road and Glenn Harwell/Beauchamp Road.
- Design Year 2045:
 - All improvements included in Opening Year 2025.
 - At the US 92 intersection:
 - An additional through lane in the eastbound and westbound directions
 - An additional westbound right turn lane
 - An additional southbound left turn lane
 - Extending the eastbound left turn storage length to 475 ft and the westbound left turn storage length to 325 ft.

The No-Build Alternative improvements for Opening Year 2025 are shown in **Figure 5-1** and for Design Year 2045 are shown in **Figure 5-2**.

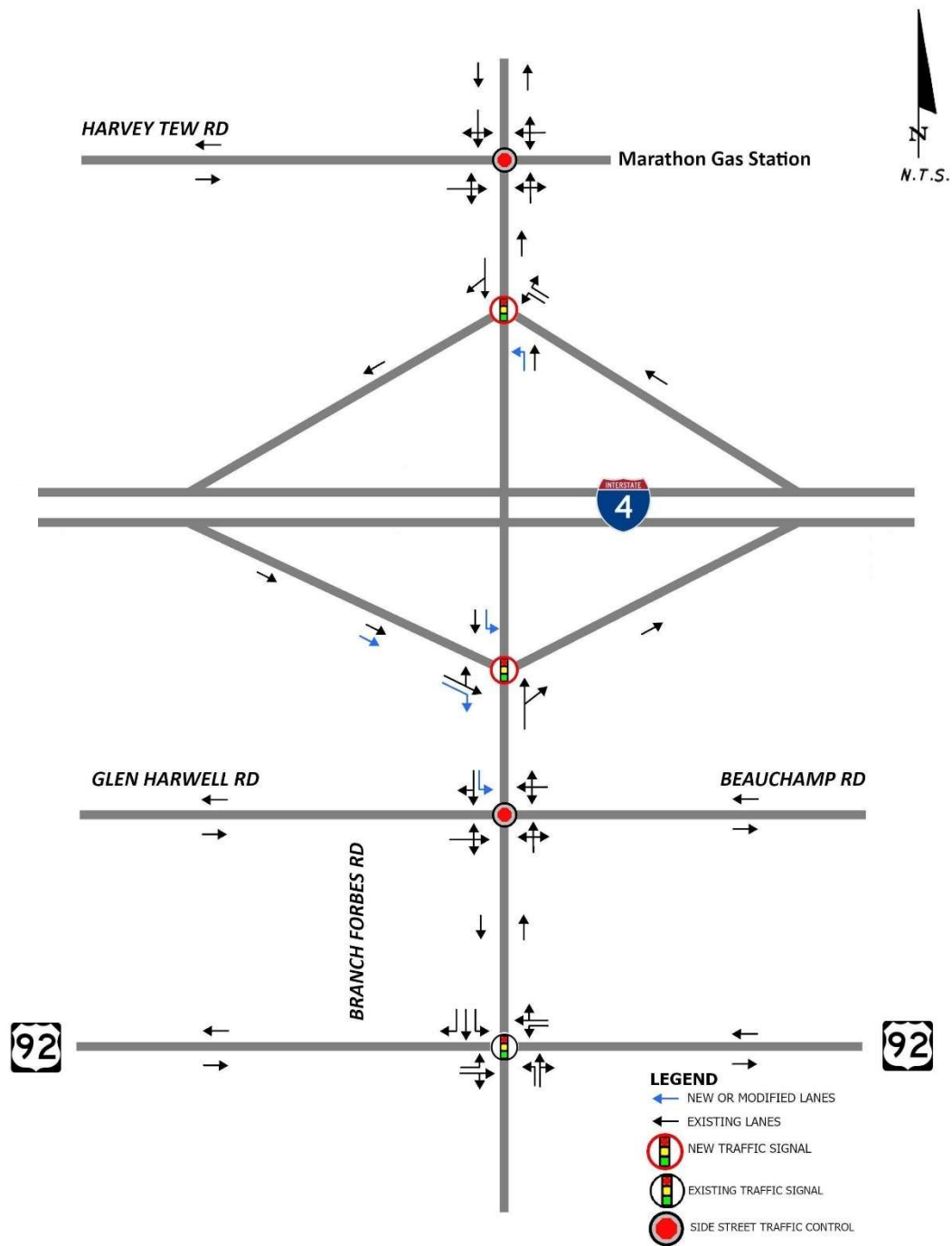


Figure 5-1 Opening Year (2025) No-Build Alternative Geometry

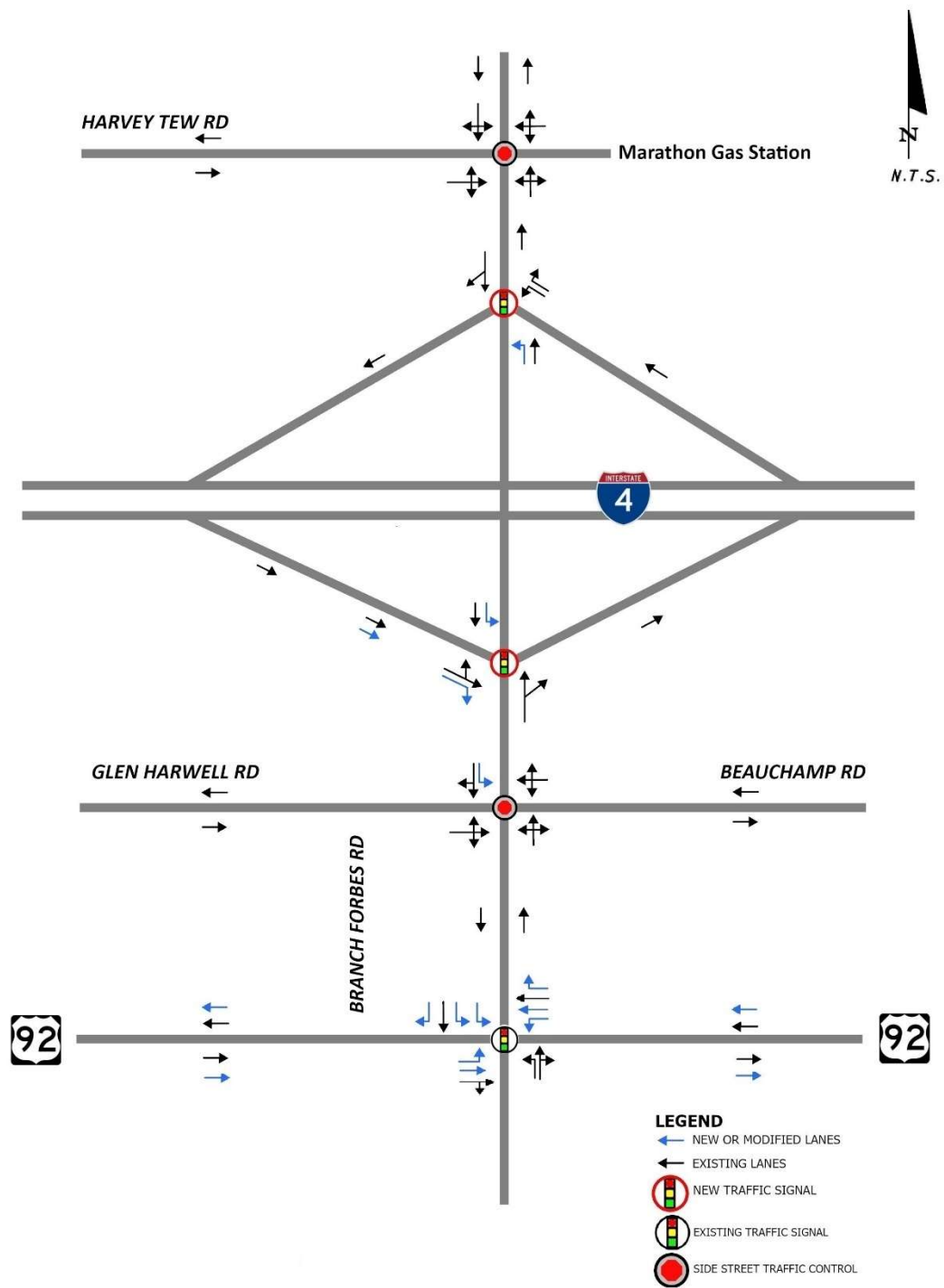


Figure 5-2 Design Year (2045) No-Build Alternative Geometry

5.1.1 Opening Year 2025 No-Build Analysis

The improvements included in **Figure 5-1** and discussed in Section 5.1 are included in the Year 2025 No-Build analysis. **Tables 5-1** and **5-2** summarize the intersections operational analysis results for the Year 2025 No-Build.

Table 5-1 Opening Year (2025) No-Build Intersection Delay and LOS Results

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Branch Forbes Road at Harvey Tew Road*							
Eastbound	Left/Thru/Right	15.4	C	C	16.3	C	C
Westbound	Left/Thru/Right	43.3	E	E	24.4	C	C
Northbound	Left	9.0	A		8.3	A	
Southbound	Left	8.0	A		8.1	A	
Intersection: Branch Forbes Road at I-4 WB Ramps							
Westbound	Left/Thru	54.6	D	D	46.3	D	D
Northbound	Left	11.6	B	A	29.7	C	B
	Through	0.0	A		4.6	A	
Southbound	Thru/Right	33.0	C	C	28.3	C	C
Intersection			20.3	C	Intersection	27.9	C
Intersection: Branch Forbes Road at I-4 EB Ramps							
Eastbound	Left/Thru	50.7	D	D	36.8	D	D
Northbound	Thru/Right	18.3	B	B	23.9	C	C
Southbound	Left	13.0	B	A	14.5	B	A
	Through	5.5	A		1.1	A	
Intersection			16.1	B	Intersection	15.2	B
Intersection: Branch Forbes Road at Glen Harwell Road/Beauchamp Road*							
Eastbound	Left/Thru/Right	804.6	F	F	501.3	F	F
Westbound	Left/Thru/Right	65.2	F	E	40.1	E	E
Northbound	Left	9.9	A		11.0	B	
Southbound	Left	11.1	B		10.0	A	
Intersection: Branch Forbes Road at US 92							
Eastbound	Left	56.0	E	C	37.3	D	C
	Thru/Right	17.2	B		20.6	C	
Westbound	Left	23.4	C	F	29.8	C	F
	Thru/Right	379.1	F		171.1	F	
Northbound	Left	33.5	C	E	41.3	D	D
	Thru/Right	108.3	F		53.5	D	
Southbound	Left	296.7	F	F	350.9	F	F
	Through	26.7	C		31.5	C	
	Right	24.5	C		22.6	C	
Intersection			185.5	F	Intersection	113.5	F

* Per HCM 6th Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6th Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection as a whole.

Table 5-2 Opening Year (2025) No-Build Alternative Intersection Vehicle Queues

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 th Percentile)		PM Peak Hour Queues (95 th Percentile)	
			Veh	Feet**	Veh	Feet**
Branch Forbes Road at Harvey Tew Road	EB Left/Thru/Right	1,000	0.4	10	0.6	15
	WB Left/Thru/Right	85	1.9	48	0.7	18
	NB Left	330	0.5	13	0.3	8
	SB Left	1,000	0.0	0	0.0	0
Branch Forbes Road at I-4 WB Ramps*	WB Left/Thru	1,800	9.7	243	14.3	358
	WB Right	1,000	0.0	0	0.0	0
	NB Left	260	7.2	180	11.9	298
	NB Thru	620	0	0	2.2	55
	SB Thru/Right	330	13.5	338	11.1	278
Branch Forbes Road at I-4 EB Ramps*	EB Left/Thru	1,700	4.7	118	5.5	138
	EB Right	840	0.0	0	0.0	0
	NB Thru/Right	380	22.4	560	18.0	450
	SB Left	260	1.5	25	1.8	45
	SB Thru	620	4.4	3	0.6	15
Branch Forbes Road at Glen Harwell Road/ Beauchamp Road	EB Left/Thru/Right	1,000	11.1	278	7.4	185
	WB Left/Thru/Right	1,000	2.5	63	1.4	35
	NB Left	1,000	0.0	0	0.1	3
	SB Left	100	0.2	5	0.2	5
Branch Forbes Road at US 92	EB Left	285	8.0	200	5.0	125
	EB Thru/Right	1,300	8.2	205	12.8	320
	WB Left	300	0.8	20	2.3	58
	WB Thru/Right	620	101.7	2,542	49.3	1,233
	NB Left	150	2.0	50	2.3	58
	NB Thru/Right	1,100	26.2	655	14.7	368
	SB Left	225	30.7	768	40.0	1,000
	SB Thru	650	11.1	278	15.6	390
	SB Right	160	7.4	185	5.4	135

*For ramps, the storage was determined as the length of the ramp or as the storage length when provided.

**Queue in feet estimated by multiplying the number of vehicles times 25 feet.

The results on **Tables 5-1 and 5-2** show the No-Build Alternative will improve the operations of the I-4 westbound and eastbound off-ramps and the overall ramp terminal intersections when compared to the existing conditions. The ramp terminal intersections are expected to operate at LOS D or better and the vehicle queues at the off-ramps will be reduced significantly. The US 92 intersection operation will continue to worsen and the southbound left turn queue will impact Branch Forbes Road southbound through movement. The 2025 No-Build Synchro results are included in **Appendix D**.

5.1.2 Design Year 2045 No-Build Alternative

The improvements included in **Figure 5-2** and discussed in Section 5.1 are included in the Year 2045 No-Build Analysis. **Tables 5-3** and **5-4** summarize the intersections operational analysis results for the Year 2045 No-Build Alternative.

Table 5-3 Design Year (2045) No-Build Intersection Delay and LOS Results

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Branch Forbes Road at Harvey Tew Road*							
Eastbound	Left/Thru/Right	54.3	F	F	76.1	F	F
Westbound	Left/Thru/Right	891.7	F	F	186.0	F	F
Northbound	Left	11.2	B		9.5	A	
Southbound	Left	8.6	A		8.9	A	
Intersection: Branch Forbes Road at I-4 WB Ramps							
Westbound	Left/Thru	142.5	F	F	86.1	F	F
Northbound	Left	248.3	F	F	149.1	F	F
	Through	0.0	A		0.1	A	
Southbound	Thru/Right	58.8	E	E	44.7	D	D
Intersection			152.3	F	Intersection	77.5	E
Intersection: Branch Forbes Road at I-4 EB Ramps							
Eastbound	Left/Thru	68.2	E	E	46.1	D	D
Northbound	Thru/Right	61.9	E	E	53.0	D	D
Southbound	Left	203.8	F	D	100.0	F	C
	Through	18.3	B		22.4	C	
Intersection			59.3	E	Intersection	43.2	D
Intersection: Branch Forbes Road at Glen Harwell Road/Beauchamp Road*							
Eastbound	Left/Thru/Right	Err**	Err**	**	Err**	Err**	**
Westbound	Left/Thru/Right	Err**	Err**	**	Err**	Err**	**
Northbound	Left	13.2	B		17.0	C	
Southbound	Left	18.4	C		14.3	B	
Intersection: Branch Forbes Road at US 92							
Eastbound	Left	197.4	F	F	165.8	F	E
	Thru/Right	37.5	D		46.5	D	
Westbound	Left	52.3	D	F	93.9	F	F
	Through	93.3	F		53.0	D	
	Right	215.7	F		294.4	F	
Northbound	Left	289.7	F	F	295.4	F	F
	Thru/Right	177.8	F		87.1	F	
Southbound	Left	129.2	F	E	201.7	F	F
	Through	20.5	C		65.5	E	
	Right	5.2	A		17.3	B	
Intersection			118.4	F	Intersection	120.3	F

* Per HCM 6th Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6th Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection as a whole.

**No results provided, or computations not completed. Delay threshold is exceeded.

Table 5-4 Design Year (2045) No-Build Alternative Intersection Vehicle Queues

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 th Percentile)		PM Peak Hour Queues (95 th Percentile)	
			Veh	Feet**	Veh	Feet**
Branch Forbes Road at Harvey Tew Road	EB Left/Thru/Right	1,000	2.5	63	4.3	108
	WB Left/Thru/Right	85	9.0	225	4.5	113
	NB Left	330	1.2	30	0.7	18
	SB Left	1,000	0.0	0	0.0	0
Branch Forbes Road at I-4 WB Ramps*	WB Left/Thru	1,800	24.3	608	32.3	808
	WB Right	1,000	0.0	0	0.0	0
	NB Left	260	75.6	1,890	35.6	890
	NB Thru	620	0	0	0.1	3
	SB Thru/Right	330	29.7	743	23.6	590
Branch Forbes Road at I-4 EB Ramps*	EB Left/Thru	1,700	9.4	235	10.6	265
	EB Right	840	0.0	0	0.0	0
	NB Thru/Right	380	34.2	855	48.7	1,218
	SB Left	260	10.6	265	9.0	225
	SB Thru	620	19.6	490	26.2	655
Branch Forbes Road at Glen Harwell Road/Beauchamp Road	EB Left/Thru/Right	1,000	***	***	***	***
	WB Left/Thru/Right	1,000	***	***	***	***
	NB Left	1,000	0.1	3	0.3	8
	SB Left	100	0.7	18	0.7	18
Branch Forbes Road at US 92	EB Left	475	26.1	653	17.2	430
	EB Thru/Right	1,300	12.8	320	20.7	518
	WB Left	325	3.0	75	9.8	245
	WB Thru	1,000	26.5	663	14.5	363
	WB Right	650	71.3	1,783	67.1	1,678
	NB Left	150	11.4	285	11.5	288
	NB Thru/Right	1,100	64.6	1,615	36.6	915
	SB Left	525	20.8	520	33.8	845
	SB Thru	650	13.9	348	45.3	1,133
	SB Right	525	5.1	128	9.4	235

*For ramps, the storage was determined as the length of the ramp or as the storage length when provided.

**Queue in feet estimated by multiplying the number of vehicles times 25 feet.

***No results provided, excessive queue

The results show the operations the improvements included in the No-Build alternative will not be enough by Design Year. The ramp terminal intersections are expected to operate at LOS E or F during the AM peak hour and the westbound ramp terminal intersection is expected to operate at LOS E. The queue from the northbound left at the westbound ramp terminal intersection will impact the eastbound ramp terminal intersection and the Glenn Harwell Road/Beauchamp Road intersection. The 2045 No-Build Synchro results are included in **Appendix D**.

5.2 BUILD ALTERNATIVE

The Build Alternative consists of the improvements identified in the US 92 PD&E Study for the US 92 intersection as discussed in Section 5.1 plus the following improvements:

- Widening of Branch Forbes Road from two lane undivided roadway to a four-lane divided roadway from south of US 92 intersection to north of Harvey Tew intersection.
- TUDI with the following improvements:
 - At the I-4 westbound ramp terminal intersection:
 - Dual northbound left turn lanes extending south to north of the Glen Harwell Road/Beauchamp Road intersection.
 - Adding an additional 500-ft left turn lane creating dual left turn lanes.
 - At the I-4 eastbound ramp terminal intersection:
 - Adding an additional I-4 eastbound right turn lane to create dual right turn lanes.
- Access management improvements at the Glen Harwell Road/Beauchamp Road intersection.

The Build Alternative improvements for Opening Year 2025 and Design Year 2045 are shown in **Figure 5-3**.

With the access management improvements, the vehicles making the left and through movement from Glenn Harwell Road were assumed to make a right turn and make a U-turn movement at Keene Drive. Vehicles making a left and through from Beauchamp Road were assumed to make a right turn and make a U-turn at Harvey Tew Road.

5.2.1 Opening Year 2025 Build Alternative

The improvements included in **Figure 5-3** and discussed in Section 5.2 are included in the Year 2025 Build Analysis. **Tables 5-5 and 5-6** summarize the intersections operational analysis results for the Year 2025 Build Alternative.

The results show all the intersections operating at LOS D or better in Opening Year. The intersection of Keene Road was added to the Synchro analysis to estimate the storage needed for the southbound U-turn movement. None of the intersections movements queues are expected to exceed their storage length.

HCM 6th Edition results are not provided for the I-4 westbound ramps intersection under the Build Alternative because the HCM 6th Edition methodology does not support movements with shared and exclusives lanes. Therefore, HCM 2000 results were provided for all signalized intersections under the Build alternative. The 2025 Build Synchro results are included in **Appendix E**.

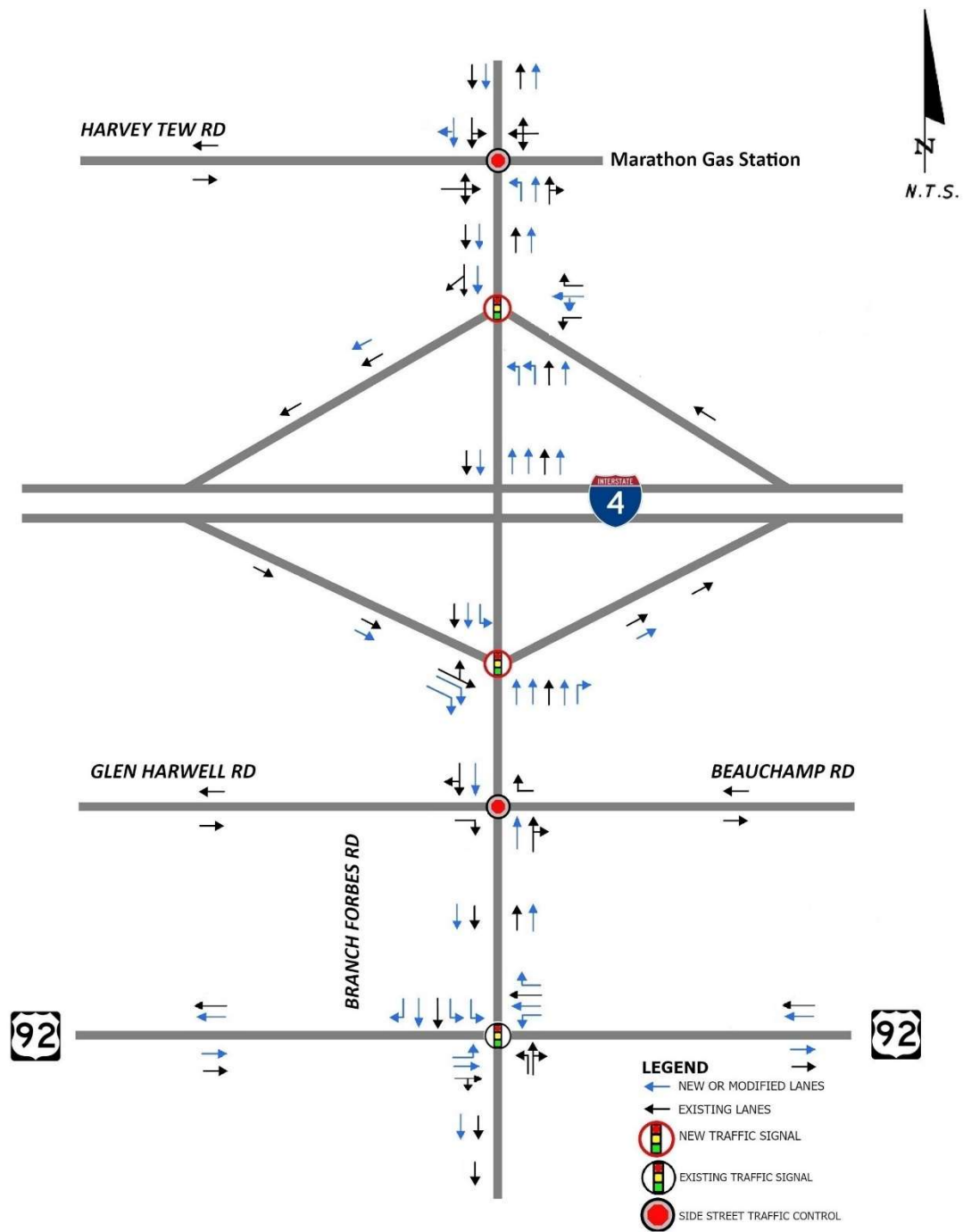


Figure 5-3 Build Alternative Geometry

Table 5-5 Opening Year (2025) Build Intersection Delay and LOS Results

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Branch Forbes Road at Harvey Tew Road*							
Eastbound	Left/Thru/Right	13.5	B	B	14.0	B	B
Westbound	Left/Thru/Right	30.0	D	D	20.3	C	C
Northbound	Left	9.2	A		8.5	A	
Southbound	Left	8.0	A		8.2	A	
	Through	0.1	A		0.0	A	
Intersection: Branch Forbes Road at I-4 WB Ramps							
Westbound	Left	37.7	D	D	36.8	D	D
	Left/Thru	37.8	D		36.9	D	
	Right	36.8	D		34.0	C	
Northbound	Left	39.5	D	C	23.7	C	B
	Through	3.1	A		3.3	A	
Southbound	Thru/Right	30.0	C	C	33.1	C	C
Intersection			31.8	C	Intersection	26.4	C
Intersection: Branch Forbes Road at I-4 EB Ramps							
Eastbound	Left/Thru	52.7	D	D	56.2	E	D
	Right	49.5	D		52.7	D	
Northbound	Thru	7.7	A	A	15.0	B	A
	Right	0.3	A		0.3	A	
Southbound	Left	21.9	C	A	39.5	D	A
	Through	6.5	A		2.6	A	
Intersection			17.8	B	Intersection	23.5	C
Intersection: Branch Forbes Road at Glen Harwell Road/Beauchamp Road*							
Eastbound	Right	13.1	B	B	14.3	B	B
Westbound	Right	14.1	B	B	12.0	B	B
Intersection: Branch Forbes Road at Keene Drive*							
Eastbound	Left/Right	52.7	F	F	45.3	E	E
Northbound	Left	10.1	B		11.1	B	
Southbound	U-turn	23.6	C		16.4	C	
Intersection: Branch Forbes Road at US 92							
Eastbound	Left	50.3	D	D	40.8	D	D
	Thru/Right	30.2	C		39.8	D	
Westbound	Left	40.6	D	D	57.8	E	D
	Thru	49.5	D		55.0	D	
	Right	31.3	C		24.9	C	
Northbound	Left	32.3	C	D	39.2	D	D
	Thru/Right	54.0	D		51.9	D	
Southbound	Left	43.7	D	C	30.0	C	C
	Through	12.5	B		11.8	B	
	Right	8.8	A		29.5	C	
Intersection			36.4	D	Intersection	34.7	C

* Per HCM 6th Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6th Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection as a whole.

Table 5-6 Opening Year (2025) Build Alternative Intersection Vehicle Queues

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 th Percentile)		PM Peak Hour Queues (95 th Percentile)	
			Veh	Feet	Veh	Feet
Branch Forbes Road at Harvey Tew Road**	EB Left/Thru/Right	1,000	0.3	8	0.5	13
	WB Left/Thru/Right	85	1.3	33	0.6	15
	NB Left	100	0.5	13	0.4	10
	SB Left	1,000	0.0	0	0.0	0
	SB Thru	1,000	0.0	0	0.0	0
Branch Forbes Road at I-4 WB Ramps	WB Left	500	--	105	--	169
	WB Left/ Thru	1,800	--	108	--	172
	WB Right	1,000	--	65	--	60
	NB Left	1,000	--	132	--	44
	NB Thru	620	--	37	--	20
	SB Thru/ Right	330	--	207	--	172
Branch Forbes Road at I-4 EB Ramps	EB Left/ Thru	1,700	--	110	--	150
	EB Right*	1,250	--	53	--	79
	NB Thru	380	--	100	--	113
	NB Right	380	--	m0	--	0
	SB Left	260	--	122	--	56
	SB Thru	620	--	98	--	72
Branch Forbes Road at Glen Harwell Road/ Beauchamp Road**	EB Right	1,000	0.6	15	0.5	13
	WB Right	1,000	0.5	13	0.3	8
Branch Forbes at Keene Drive**	EB Left/ Right	1,000	0.9	23	0.6	15
	NB Left	150	0	0	0.1	3
	SB U-turn	150	1.3	33	0.9	23
Branch Forbes Road at US 92	EB Left	475	--	#180	--	150
	EB Thru/Right	1,300	--	128	--	222
	WB Left	325	--	44	--	102
	WB Thru	1,000	--	231	--	176
	WB Right	650	--	285	--	123
	NB Left	150	--	63	--	72
	NB Thru/Right	1,100	--	#502	--	379
	SB Left	525	--	185	--	196
	SB Thru	1,000	--	130	--	160
	SB Right	500	--	104	--	58

*Average of both right turn lanes

**For unsignalized intersections, queue in feet estimated by multiplying the number of vehicles times 25 ft.

m: Volume for 95th percentile queue is metered by upstream signal

#: 95th percentile volume exceeds capacity, queue may be longer

5.2.2 Design Year 2045 Build Alternative

Tables 5-7 and 5-8 summarize the intersections operational analysis results for the Year 2045 Build Alternative. A different cycle length than the one used for opening year analysis was used to analyze the design year operations.

Table 5-7 Design Year (2045) Build Intersection Delay and LOS Results

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Branch Forbes Road at Harvey Tew Road*							
Eastbound	Left/Thru/Right	36.0	E	E	36.3	E	E
Westbound	Left/Thru/Right	337.5	F	F	82.7	F	F
Northbound	Left	12.2	B		9.9	A	
Southbound	Left	8.7	A		8.9	A	
	Through	0.2	A		0.1	A	
Intersection: Branch Forbes Road at I-4 WB Ramps							
Westbound	Left	54.5	D	D	48.9	D	D
	Left/Thru	54.5	D		49.2	D	
	Right	48.5	D		41.1	D	
Northbound	Left	23.7	C	B	23.5	C	B
	Through	2.7	A		6.5	B	
Southbound	Thru/Right	53.2	D	D	37.3	D	D
Intersection			36.0	D	Intersection	31.2	C
Intersection: Branch Forbes Road at I-4 EB Ramps							
Eastbound	Left/Thru	40.3	D	D	29.4	C	D
	Right	52.2	D		49.3	D	
Northbound	Thru	20.3	C	B	27.4	C	B
	Right	0.1	A		0.3	A	
Southbound	Left	23.7	C	A	38.9	D	B
	Through	4.7	A		12.1	B	
Intersection			22.3	C	Intersection	26.6	C
Intersection: Branch Forbes Road at Glen Harwell Road/Beauchamp Road*							
Eastbound	Right	23.7	C	C	32.4	D	D
Westbound	Right	28.0	D	D	17.7	C	C
Intersection: Branch Forbes Road at Keene Drive*							
Eastbound	Left/Right	16.0	C	C	7074.4	F	F
Northbound	Left	13.7	B		17.4	C	
Southbound	U-turn	388.3	F		103.4	F	
Intersection: Branch Forbes Road at US 92							
Eastbound	Left	213.8	F	F	112.0	F	E
	Thru/Right	29.0	C		41.7	D	
Westbound	Left	41.1	D	E	144.1	F	E
	Thru	76.1	E		53.8	D	
	Right	60.1	E		42.4	D	
Northbound	Left	57.7	E	F	167.4	F	F
	Thru/Right	500.0	F		129.2	F	
Southbound	Left	37.4	D	C	74.8	E	D
	Through	26.8	C		31.8	C	
	Right	31.3	C		20.9	A	
Intersection			130.2	F	Intersection	63.9	E

* Per HCM 6th Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6th Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection as a whole.

Table 5-8 Design Year (2045) Build Alternative Intersection Vehicle Queues

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 th Percentile)		PM Peak Hour Queues (95 th Percentile)	
			Veh	Feet	Veh	Feet
Branch Forbes Road at Harvey Tew Road**	EB Left	1,000	1.7	43	2.4	60
	WB Left	85	6.8	170	2.9	73
	NB Left	100	1.4	35	0.9	23
	SB Left	1,000	0.1	3	0.0	0
	SB Thru	1,000	0.0	0	0.0	0
Branch Forbes Road at I-4 WB Ramps	WB Left	500	--	191	--	305
	WB Left/ Thru	1,800	--	194	--	309
	WB Right	1,000	--	98	--	82
	NB Left	1,000	--	219	--	371
	NB Thru	620	--	2	--	80
	SB Thru/ Right	330	--	#502	--	332
Branch Forbes Road at I-4 EB Ramps	EB Left/ Thru	1,700	--	138	--	174
	EB Right*	1,250	--	276	--	527
	NB Thru	380	--	m229	--	m208
	NB Right	380	--	m0	--	m0
	SB Left	260	--	m118	--	209
	SB Thru	620	--	m186	--	216
Branch Forbes Road at Glen Harwell Road/ Beauchamp Road**	EB Right	1,000	2.3	58	2.6	65
	WB Right	1,000	1.9	48	0.9	23
Branch Forbes at Keene Drive**	EB Left/ Right	1,000	0.2	5	3.9	98
	NB Left	150	0.1	3	0.3	8
	SB U-turn	150	11.7	293	7.3	183
Branch Forbes Road at US 92	EB Left	475	--	#474	--	#322
	EB Thru/Right	1,300	--	222	--	423
	WB Left	325	--	71	--	#241
	WB Thru	1,000	--	#487	--	305
	WB Right	650	--	#774	--	532
	NB Left	150	--	126	--	#197
	NB Thru/Right	1,100	--	#1,261	--	#843
	SB Left	525	--	259	--	#484
	SB Thru	1,000	--	240	--	393
	SB Right	500	--	230	--	m113

*Average of both right turn lanes

**For unsignalized intersections, queue in feet estimated by multiplying the number of vehicles times 25 ft.

m: Volume for 95th percentile queue is metered by upstream signal

#: 95th percentile volume exceeds capacity, queue may be longer

The results show the ramp terminal intersections operating at LOS D or better in the Design Year and queues from the ramps are not expected to impact the I-4 mainline.

The US 92 intersection is expected to operate at LOS F in the AM peak hour and LOS E in the PM peak hour. The queues for the eastbound left, westbound right, and shared northbound through/right movements are expected to exceed the storage length during the AM peak hour.

The intersection of Keene Road was added to the Synchro analysis as part of the access management improvement at the Glen Harwell Road/Beauchamp Road intersection to estimate the storage needed for the southbound U-turn movement that is re-routed from Glen Harwell Road. Based on the Design Year results, a storage length of 300 feet will be needed for the southbound U-turn movement based on projected future traffic.

The 2045 Build Synchro results are included in **Appendix E**.

An additional evaluation was performed adding a northbound through lane (550 feet) and an additional eastbound left turn lane at the US 92 at Branch Forbes Road intersection to determine if adding the lanes will improve the intersection LOS and queues. **Figure 5-4** shows the Build Alternative geometry with the additional improvements at the US 92 intersection. **Tables 5-9 and 5-10** show the intersection operation results.

As shown in **Table 5-9**, the intersection is expected to operate at LOS E in the AM peak hour, but the intersection delay is reduced by 50%. During the PM peak hour, the intersection LOS improves from E to D. As shown in **Table 5-10**, only the queue for the westbound right turn movement is expected to exceed the storage length during the AM peak hour.

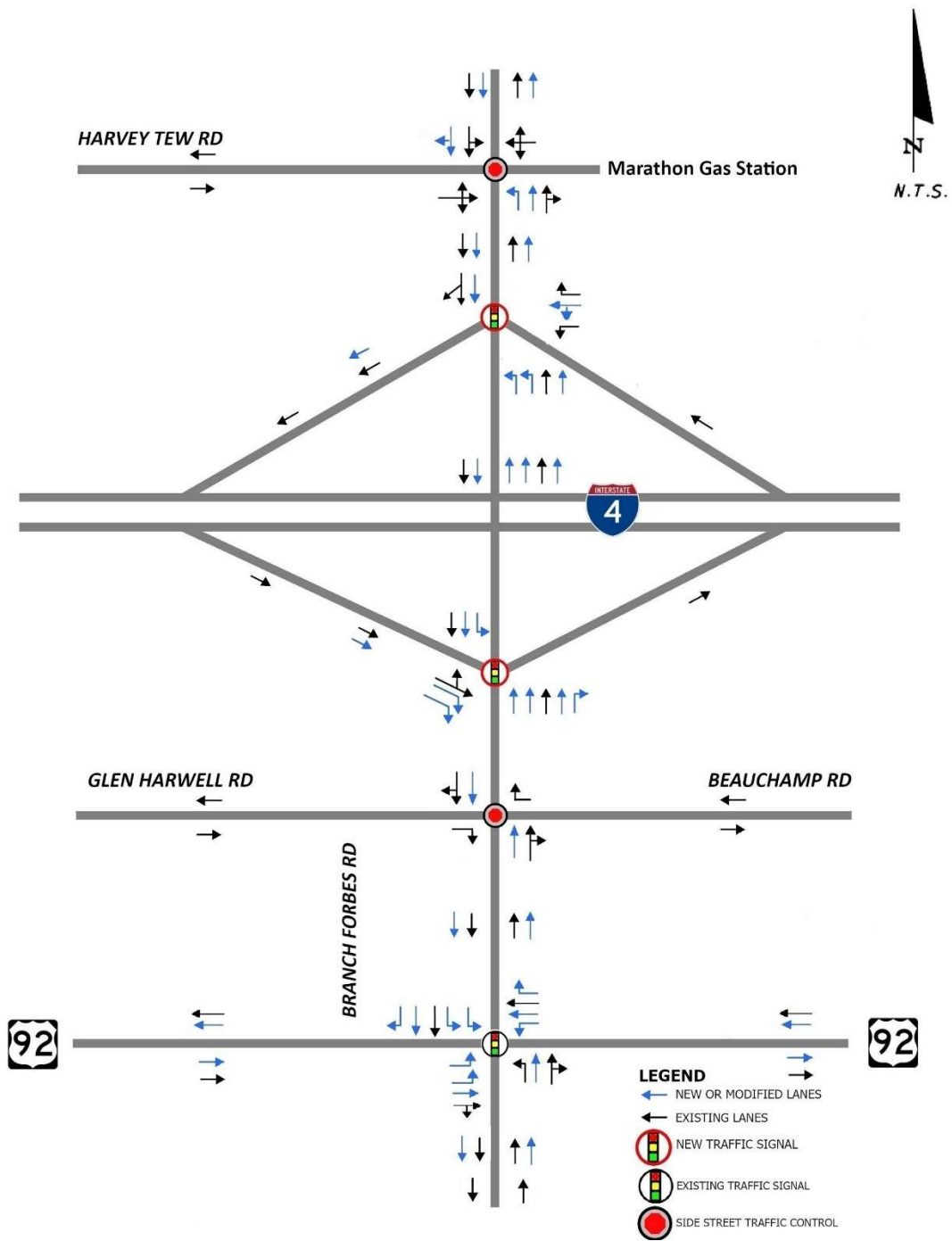


Figure 5-4 Build Alternative Geometry with Additional US 92 Intersection Improvements

Table 5-9 Design Year (2045) Build Intersection Delay and LOS Results with Additional US 92 Intersection Improvements

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Branch Forbes Road at US 92							
Eastbound	Left	74.7	E	D	65.9	E	E
	Thru/Right	38.2	D		66.9	E	
Westbound	Left	65.1	E	E	94.8	F	D
	Thru	64.4	E		49.5	D	
	Right	59.2	E		29.0	C	
Northbound	Left	57.7	E	F	64.4	E	E
	Thru/Right	108.2	F		82.1	F	
Southbound	Left	39.6	D	C	39.1	D	C
	Through	29.1	C		29.1	C	
	Right	31.7	C		28.0	C	
Intersection			58.6	E	Intersection	49.7	D

Table 5-10 Design Year (2045) Build Alternative Intersection Vehicle Queues with Additional US 92 Intersection Improvements

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 th Percentile)		PM Peak Hour Queues (95 th Percentile)	
			Veh	Feet	Veh	Feet
Branch Forbes Road at US 92	EB Left	475	--	#208	--	161
	EB Thru/Right	1,300	--	268	--	#512
	WB Left	325	--	82	--	#212
	WB Thru	1,000	--	#487	--	299
	WB Right	650	--	#774	--	458
	NB Left	150	--	126	--	135
	NB Thru/Right	1,100	--	#508	--	#392
	SB Left	525	--	261	--	m369
	SB Thru	1,000	--	254	--	m352
	SB Right	500	--	229	--	m93

m: Volume for 95th percentile queue is metered by upstream signal

#: 95th percentile volume exceeds capacity, queue may be longer

5.3 FUTURE CONDITIONS SAFETY ANALYSIS

The Build Alternative improvements for Branch Forbes Road include widening Branch Forbes Road from a two-lane undivided roadway to a four-lane divided roadway, access management, and additional left turn and right turn lanes at the I-4 ramp terminal intersections. A crash modification factor (CMF) of 0.341 was obtained from the CMF Clearinghouse. CMF ID 7566 was used in this PTAR because it includes Florida data. The CMF represents a reduction of 66% in total crashes along Branch Forbes Road. Therefore, the improvement is expected to reduce 66% of the 45 applicable crashes that occur along Branch Forbes Road.

The information for CMF 7566 is included in Appendix F.

SECTION 6 SUMMARY OF ANALYSIS RESULTS

The Build Alternative for Branch Forbes Road consists of the following improvements:

- Widening of Branch Forbes Road from two a lane undivided roadway to a four-lane divided roadway from south of US 92 intersection to north of Harvey Tew Road intersection.
- TUDI interchange with the following improvements:
 - At the I-4 westbound ramp terminal intersection:
 - Dual northbound left turn lanes extending south to north of the Glen Harwell Road/Beauchamp Road intersection
 - Adding an additional westbound 500-ft left turn lane creating dual left turn lanes
 - At the I-4 eastbound ramp terminal intersection:
 - Adding an additional I-4 eastbound right turn lane to create dual right turn lanes
- Access management improvements at the Glen Harwell Road/Beauchamp Road intersection
- At US 92 intersection:
 - An additional through lane in the eastbound and westbound directions
 - An additional westbound right turn lane
 - An additional southbound left turn lane
 - Extending the eastbound left turn storage length to 475 ft and the westbound left turn storage length to 325 ft

As shown in **Table 6-1**, the Build Alternative improves the intersection delays compared to the No-Build Alternative. **Table 6-2** shows the arterial LOS results of the No-Build and Build Alternatives. The widening of Branch Forbes Road will improve the capacity, operation, and safety along Branch Forbes Road and improve connectivity between I-4 and US 92.

Table 6-1 Design Year (2045) Intersection Analysis Summary

Intersection	No-Build (2045) Intersection Results				Build (2045) Intersection Results			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Harvey Tew Road*	891.7	F	186.0	F	337.5	F	82.7	F
I-4 WB Ramps	152.3	F	77.5	E	36.0	D	31.2	C
I-4 EB Ramps	59.3	E	43.2	D	22.3	C	26.6	C
Glen Harwell Road/ Beauchamp Road*	Err	**	Err	**	28.0	D	32.4	D
Keene Drive	--	--	--	--	388.3	F	7074.4	F
US 92	118.4	F	120.3	F	130.2	F	63.9	E

*Represents highest delay for the unsignalized intersection

**No results provided, or computations not completed. Delay threshold is exceeded.

Table 6-2 Design Year (2045) Arterial LOS

Cross Street along Branch Forbes Road	No-Build (2045) Arterial Results				Build (2045) Arterial Results			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS
Northbound Direction								
US 92	3.6	F	6.4	F	1.4	F	4.8	F
I-4 EB On-ramp	3.7	F	3.9	F	21.3	D	19.2	D
I-4 WB On-ramp	18.6	D	10.6	F	24.3	C	19.8	D
Total	4.3	F	5.1	F	4.2	F	10.3	F
Southbound Direction								
I-4 WB On-ramp	3.9	F	11.6	F	14.0	E	16.4	E
I-4 EB On-ramp	26.4	C	20.7	D	21.1	D	15.5	E
US 92	18.0	D	14.2	E	19.6	D	18.2	D
Total	7.6	F	13.6	E	17.1	D	17.0	D

Additional improvements were evaluated at the US 92 intersection to improve the intersection operations for design year: an additional northbound through lane (550 feet) and an additional eastbound left turn lane. **Tables 6-3** show the intersection operational results with the additional improvements at the US 92 intersection. The US 92 intersection is expected to operate at LOS E in the AM peak hour, but the intersection delay is reduced by 50%. During the PM peak hour, the intersection LOS improves from E to D.

Table 6-3 Design Year (2045) Intersection Analysis Summary with Additional US 92 Intersection Improvements

Intersection	No-Build (2045) Intersection Results				Build (2045) Intersection Results			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Harvey Tew Road*	891.7	F	186.0	F	337.5	F	82.7	F
I-4 WB Ramps	152.3	F	77.5	E	36.8	D	31.8	C
I-4 EB Ramps	59.3	E	43.2	D	22.6	C	28.0	C
Glen Harwell Road/ Beauchamp Road*	Err	**	Err	**	28.0	D	32.4	D
Keene Drive	--	--	--	--	388.3	F	7074.4	F
US 92	118.4	F	120.3	F	58.6	E	49.7	D

*Represents highest delay for the unsignalized intersection

**No results provided, or computations not completed. Delay threshold is exceeded.

Table 6-4 Design Year (2045) Arterial LOS with Additional US 92 Intersection Improvements

Cross Street along Branch Forbes Road	No-Build (2045) Arterial Results				Build (2045) Arterial Results			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS	Arterial Speed (mph)	LOS
Northbound Direction								
US 92	3.6	F	6.4	F	5.6	F	6.8	F
I-4 EB On-ramp	3.7	F	3.9	F	21.0	D	19.3	D
I-4 WB On-ramp	18.6	D	10.6	F	23.5	C	19.0	D
Total	4.3	F	5.1	F	11.8	F	12.6	F
Southbound Direction								
I-4 WB On-ramp	3.9	F	11.5	F	14.1	E	16.4	E
I-4 EB On-ramp	26.4	C	20.7	D	21.3	D	14.8	E
US 92	23.1	C	19.4	D	19.3	D	18.9	D
Total	8.0	F	15.4	E	17.1	D	17.2	D

APPENDICES

APPENDIX A	Approved PTAR Methodology
APPENDIX B	Traffic Data from Approved I-4 at Branch Forbes Road IOAR
APPENDIX C	Existing (2020) Operational Analysis
APPENDIX D	No-Build Alternative Operational Analysis
APPENDIX E	Build Alternative Operational Analysis
APPENDIX F	CMF 7566

APPENDIX A Approved PTAR Methodology

Correa, Rosana X.

From: Maass, Peter <Peter.Maass@dot.state.fl.us>
Sent: Friday, July 8, 2022 1:47 PM
To: Correa, Rosana X.; Winkle, David; Matthew G. Wey, PE
Subject: [EXTERNAL] RE: Branch Forbes Road and McIntosh Road - PTAR Methodology

Rosana,
As discussed this morning, please proceed. Methodology looks good.

Peter Maass, PE, PTOE
District Seven Project Development and Analysis
peter.maass@dot.state.fl.us
813-975-6425

From: Correa, Rosana X. <Rosana.Correa@jacobs.com>
Sent: Tuesday, July 5, 2022 3:00 PM
To: Winkle, David <David.Winkle@dot.state.fl.us>; Maass, Peter <Peter.Maass@dot.state.fl.us>; Matthew G. Wey, PE <mwey@weyeng.com>
Subject: Branch Forbes Road and McIntosh Road - PTAR Methodology

EXTERNAL SENDER: Use caution with links and attachments.

Good afternoon,

Below is the PTARs Methodology discussed at the call earlier today:

- Summarize data/improvements at US-92 intersection per scope
- Data collection
 - Traffic data from the Brach Forbes Rd IOAR and McIntosh Non-IAR will be used.
 - Data will be developed for McIntosh at Newsome Road since this intersection is added to the network
- Analysis Years:
 - Year 2020 (Existing Year)
 - Year 2025 (Opening Year)
 - Year 2045 (Design Year)
- Travel Demand Forecasting
 - Travel demand forecasting procedure from Brach Forbes Rd IOAR and McIntosh Non-IAR will be summarized.
- Synchro version 11 will be used for the operation analysis
- No-Build Analysis:
 - 2025: Will include the interchange improvements identified in the Brach Forbes Rd IOAR and McIntosh Non-IAR
 - 2045: Will include the Will include the interchange improvements identified in the Brach Forbes Rd IAOR and McIntosh Non-IAR plus US 92 intersection improvements.
- Build Analysis: For both Years 2025 and 2045

- Will include the TUDI alternative
- Widening of Branch Forbes and McIntosh Road
- US 92 intersection improvements
- Crash Data:
 - Crash data from 2015 – 2019 will be summarized in each PTAR

Let me know if you have any comments or questions.

Thanks,
Rosana

Rosana Correa, P.E. (FL, PR), PTOE, FITE | Jacobs | 813.676.2041 direct | rosana.correa@jacobs.com | www.jacobs.com



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APPENDIX B Traffic Data from Approved I-4 at Branch Forbes Road IOAR

Station Name: Beauchamp Rd East of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #326

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date:03/03/2020		Station Name: Beauchamp Rd East of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	1	0	2	0	0	0	1	8	45	55	30	6	12
30	0	0	1	0	0	0	0	17	37	73	12	15	12
45	1	1	1	0	1	4	23	22	46	17	3	9	
0	1	0	1	1	0	5	43	27	42	6	5	19	
Hr Total	3	1	5	1	1	10	91	131	216	65	29	52	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	6	13	11	12	24	13	11	10	8	5	3	4	
30	14	16	15	13	15	20	18	15	8	5	2	1	
45	12	16	14	11	13	17	21	7	13	8	3	4	
0	13	12	12	15	25	9	10	5	6	8	3	0	
Hr Total	45	57	52	51	77	59	60	37	35	26	11	9	
24 Hour Total :		1124											
AM Peak Hour Begins :		8:00		AM Peak Volume :			216		AM Peak Hour Factor :			0.74	
PM Peak Hour Begins :		16:00		PM Peak Volume :			77		PM Peak Hour Factor :			0.77	

Date:03/03/2020		Station Name: Beauchamp Rd East of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	2	0	0	0	0	0	5	13	33	31	9	12	10
30	0	4	0	3	0	5	15	63	28	13	8	9	
45	1	3	0	2	4	7	26	81	13	15	15	12	
0	0	1	0	1	0	19	29	50	12	15	7	8	
Hr Total	3	8	0	6	4	36	83	227	84	52	42	39	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	11	12	10	25	24	32	17	9	10	5	5	6	
30	8	16	20	20	13	43	14	11	5	9	6	2	
45	11	4	18	23	20	25	13	8	2	7	4	2	
0	10	20	14	16	31	19	8	6	5	5	0	1	
Hr Total	40	52	62	84	88	119	52	34	22	26	15	11	
24 Hour Total :		1189											
AM Peak Hour Begins :		7:00		AM Peak Volume :			227		AM Peak Hour Factor :			0.70	
PM Peak Hour Begins :		16:45		PM Peak Volume :			131		PM Peak Hour Factor :			0.76	

Station Name: Beauchamp Rd East of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #326

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date:03/04/2020		Station Name: Beauchamp Rd East of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	1	0	0	0	0	0	5	9	7	4	12	8	
30	0	1	0	2	0	0	3	11	9	5	5	10	
45	3	0	0	1	0	2	9	11	11	9	3	7	
0	2	0	0	0	1	8	16	8	4	9	16	16	
Hr Total	6	1	0	3	1	10	33	39	31	27	36	41	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	10	12	18	13	16	18	12	20	8	3	8	3	
30	8	15	13	22	17	16	14	13	2	8	4	5	
45	9	9	16	14	12	20	20	7	5	4	3	0	
0	34	7	16	11	13	20	10	9	0	8	3	1	
Hr Total	61	43	63	60	58	74	56	49	15	23	18	9	
24 Hour Total :			757										
AM Peak Hour Begins :			6:45	AM Peak Volume :				47	AM Peak Hour Factor :				0.73
PM Peak Hour Begins :			17:00	PM Peak Volume :				74	PM Peak Hour Factor :				0.54

Date:03/04/2020		Station Name: Beauchamp Rd East of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	1	0	0	0	0	0	7	14	28	15	12	6	7
30	0	0	0	1	1	7	15	35	9	9	7	11	
45	0	0	0	0	5	14	25	28	11	3	10	14	
0	1	1	1	2	4	9	35	15	8	8	15	10	
Hr Total	2	1	1	3	10	37	89	106	43	32	38	42	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	8	11	18	28	30	22	20	13	2	10	3	1	
30	14	17	23	15	16	29	18	8	7	4	7	3	
45	8	12	28	21	38	23	6	3	4	22	4	1	
0	10	17	17	23	28	13	9	6	2	16	1	0	
Hr Total	40	57	86	87	112	87	53	30	15	52	15	5	
24 Hour Total :			1043										
AM Peak Hour Begins :			6:45	AM Peak Volume :				126	AM Peak Hour Factor :				0.90
PM Peak Hour Begins :			16:30	PM Peak Volume :				117	PM Peak Hour Factor :				0.77

Station Name: Beauchamp Rd East of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #326

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020	Station Name: Beauchamp Rd East of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	3	0	0	2	0	2	8	7	4	6	8	13
30	0	2	0	2	1	0	4	12	9	12	4	14
45	2	2	2	0	1	3	5	16	4	6	11	9
0	2	1	0	0	0	5	18	8	4	6	8	10
Hr Total	7	5	2	4	2	10	35	43	21	30	31	46
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	15	16	14	8	16	16	15	10	7	7	5	6
30	7	13	17	17	26	25	21	11	8	7	2	0
45	10	18	10	10	23	19	25	9	9	5	3	1
0	14	13	13	15	28	8	9	7	4	3	4	2
Hr Total	46	60	54	50	93	68	70	37	28	22	14	9
24 Hour Total :		787										
AM Peak Hour Begins :		6:45		AM Peak Volume :			53		AM Peak Hour Factor :			0.74
PM Peak Hour Begins :		16:00		PM Peak Volume :			93		PM Peak Hour Factor :			0.83

Date: 03/05/2020	Station Name: Beauchamp Rd East of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	1	1	0	0	11	13	31	13	6	16	7
30	1	2	1	1	2	4	15	38	11	11	6	7
45	2	2	1	0	2	6	16	28	11	13	13	9
0	0	1	1	0	3	18	34	19	8	7	4	14
Hr Total	3	6	4	1	7	39	78	116	43	37	39	37
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	12	12	16	25	26	33	18	13	7	9	3	0
30	12	7	23	16	20	38	30	8	3	9	2	1
45	14	15	26	27	37	29	15	6	3	7	4	4
0	11	21	21	30	43	23	16	4	12	5	2	2
Hr Total	49	55	86	98	126	123	79	31	25	30	11	7
24 Hour Total :		1130										
AM Peak Hour Begins :		6:45		AM Peak Volume :			131		AM Peak Hour Factor :			0.86
PM Peak Hour Begins :		16:30		PM Peak Volume :			151		PM Peak Hour Factor :			0.88

Station Name: Branch Forbes Rd North of US 92

Description: 72Hr Volume Counts ADR #113

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: Branch Forbes Rd North of US 92 - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0											
AM Peak Hour Begins :		0:00		AM Peak Volume :				0		AM Peak Hour Factor :			
PM Peak Hour Begins :		12:00		PM Peak Volume :				0		PM Peak Hour Factor :			

Date: 03/03/2020		Station Name: Branch Forbes Rd North of US 92 - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	35	20	10	29	30	77	310	321	307	318	219	261	
30	31	31	25	23	40	137	294	338	337	355	261	232	
45	26	9	14	39	75	159	342	351	312	285	247	254	
0	24	20	18	36	71	203	344	325	318	260	255	245	
Hr Total	116	80	67	127	216	576	1290	1335	1274	1218	982	992	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	284	237	322	336	364	367	327	260	178	123	134	51	
30	260	301	340	318	372	422	333	263	195	176	107	51	
45	243	332	308	332	305	390	267	225	183	176	78	51	
0	273	293	328	333	319	324	236	201	129	128	82	29	
Hr Total	1060	1163	1298	1319	1360	1503	1163	949	685	603	401	182	
24 Hour Total :		19959											
AM Peak Hour Begins :		6:45		AM Peak Volume :				1354		AM Peak Hour Factor :			
PM Peak Hour Begins :		17:00		PM Peak Volume :				1503		PM Peak Hour Factor :			

Station Name: Branch Forbes Rd North of US 92

Description: 72Hr Volume Counts ADR #113

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: Branch Forbes Rd North of US 92 - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	0	0	0	0	0	0	58	188	185	183	146	115	158
30	0	0	0	0	0	0	86	208	226	187	123	118	116
45	0	0	0	0	0	0	117	227	207	171	158	139	131
0	0	0	0	0	0	0	138	192	181	148	123	124	153
Hr Total	0	0	0	0	0	0	399	815	799	689	550	496	558
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	136	172	167	163	164	175	165	121	81	124	85	23	
30	135	153	168	187	172	207	118	116	82	111	57	20	
45	146	154	162	186	163	197	140	90	69	69	34	17	
0	136	186	179	176	195	180	118	93	72	103	26	14	
Hr Total	553	665	676	712	694	759	541	420	304	407	202	74	
24 Hour Total :			10313										
AM Peak Hour Begins :			6:30	AM Peak Volume :				830	AM Peak Hour Factor :				0.91
PM Peak Hour Begins :			16:45	PM Peak Volume :				774	PM Peak Hour Factor :				0.93

Date: 03/04/2020		Station Name: Branch Forbes Rd North of US 92 - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	34	20	15	24	35	32	87	111	130	95	149	149	
30	33	24	18	30	49	31	109	110	92	112	135	202	
45	36	22	24	35	64	46	141	122	104	128	133	156	
0	29	16	20	29	74	51	146	138	108	119	148	149	
Hr Total	132	82	77	118	222	160	483	481	434	454	565	656	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	150	140	135	0	0	0	0	0	0	0	0	0	
30	166	172	134	0	0	0	0	0	0	0	0	0	
45	171	139	0	0	0	0	0	0	0	0	0	0	
0	144	105	0	0	0	0	0	0	0	0	0	0	
Hr Total	631	556	269	0	0	0	0	0	0	0	0	0	
24 Hour Total :			5320										
AM Peak Hour Begins :			10:45	AM Peak Volume :				655	AM Peak Hour Factor :				0.81
PM Peak Hour Begins :			12:00	PM Peak Volume :				631	PM Peak Hour Factor :				0.92

Station Name: Branch Forbes Rd North of US 92

Description: 72Hr Volume Counts ADR #113

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020	Station Name: Branch Forbes Rd North of US 92 - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	10	8	11	9	18	35	180	166	171	108	102	91
30	12	8	7	16	24	76	194	196	145	118	102	119
45	11	12	10	15	38	105	178	192	130	110	122	136
0	13	6	5	20	36	111	186	184	123	128	103	113
Hr Total	46	34	33	60	116	327	738	738	569	464	429	459
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	112	155	143	163	156	165	159	132	91	94	75	35
30	129	134	150	171	119	215	182	129	76	142	42	26
45	123	154	139	178	125	214	133	98	76	102	37	21
0	144	155	149	189	180	205	124	79	81	109	20	17
Hr Total	508	598	581	701	580	799	598	438	324	447	174	99
24 Hour Total :			9860									
AM Peak Hour Begins :			7:15	AM Peak Volume :			743	AM Peak Hour Factor :			0.95	
PM Peak Hour Begins :			17:00	PM Peak Volume :			799	PM Peak Hour Factor :			0.93	

Date: 03/05/2020	Station Name: Branch Forbes Rd North of US 92 - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :			0									
AM Peak Hour Begins :			0:00	AM Peak Volume :			0	AM Peak Hour Factor :				
PM Peak Hour Begins :			12:00	PM Peak Volume :			0	PM Peak Hour Factor :				

Station Name: Branch Forbes Rd North of I-4 Ramps

Description: 72Hr Volume Counts ADR #126

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020	Station Name: Branch Forbes Rd North of I-4 Ramps - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	7	2	1	1	3	9	98	131	173	139	43	38
30	7	8	3	6	4	19	78	111	101	72	63	55
45	6	3	4	5	5	19	116	124	100	46	62	62
00	3	1	6	5	5	56	133	153	123	48	49	44
Hr Total	23	14	14	17	17	103	425	519	497	305	217	199
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	36	36	61	78	95	97	82	49	33	28	25	19
30	48	53	61	69	86	123	73	59	36	37	25	10
45	50	67	73	72	73	105	62	57	57	33	17	15
00	51	49	58	78	70	78	57	47	43	23	11	1
Hr Total	185	205	253	297	324	403	274	212	169	121	78	45
24 Hour Total :			4916									
AM Peak Hour Begins :			7:15	AM Peak Volume :			561	AM Peak Hour Factor :			0.81	
PM Peak Hour Begins :			17:00	PM Peak Volume :			403	PM Peak Hour Factor :			0.82	

Date: 03/03/2020	Station Name: Branch Forbes Rd North of I-4 Ramps - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	9	8	0	9	13	25	78	125	112	72	41	56
30	4	4	2	7	9	33	101	151	150	96	49	46
45	4	1	6	9	12	62	116	152	139	66	50	49
00	6	3	5	9	24	67	138	137	92	43	55	56
Hr Total	23	16	13	34	58	187	433	565	493	277	195	207
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	63	71	66	64	90	92	92	63	38	27	21	9
30	52	66	77	70	81	100	91	44	33	25	18	5
45	44	57	64	58	79	82	73	48	39	20	12	6
00	69	49	62	75	85	94	48	36	28	21	8	2
Hr Total	228	243	269	267	335	368	304	191	138	93	59	22
24 Hour Total :			5018									
AM Peak Hour Begins :			6:45	AM Peak Volume :			566	AM Peak Hour Factor :			0.93	
PM Peak Hour Begins :			17:00	PM Peak Volume :			368	PM Peak Hour Factor :			0.92	

Station Name: Branch Forbes Rd North of I-4 Ramps

Description: 72Hr Volume Counts ADR #126

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: Branch Forbes Rd North of I-4 Ramps - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	7	6	2	3	2	16	58	108	77	37	45	50	
30	7	4	5	3	3	19	79	120	44	47	43	48	
45	2	2	3	1	12	23	123	88	47	68	47	45	
00	4	1	6	3	4	43	111	88	43	50	34	51	
Hr Total	20	13	16	10	21	101	371	404	211	202	169	194	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	54	50	66	95	138	119	86	54	35	30	31	10	
30	59	54	58	118	127	131	75	63	44	44	22	14	
45	67	58	96	129	170	132	67	43	33	42	13	8	
00	39	74	101	116	175	101	63	68	38	47	10	8	
Hr Total	219	236	321	458	610	483	291	228	150	163	76	40	
24 Hour Total :			5007										
AM Peak Hour Begins :			6:30		AM Peak Volume :			462		AM Peak Hour Factor :			0.94
PM Peak Hour Begins :			16:00		PM Peak Volume :			610		PM Peak Hour Factor :			0.87

Date: 03/04/2020		Station Name: Branch Forbes Rd North of I-4 Ramps - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	6	3	3	3	7	32	81	134	88	61	57	52	
30	10	4	8	4	9	33	98	189	74	64	54	62	
45	6	4	2	5	14	52	157	161	62	64	35	49	
00	2	4	4	3	21	54	159	102	59	50	53	57	
Hr Total	24	15	17	15	51	171	495	586	283	239	199	220	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	81	87	75	80	84	103	84	59	39	20	22	7	
30	78	57	67	94	90	113	74	53	20	33	19	5	
45	73	47	75	78	115	116	69	44	29	24	11	8	
00	78	57	84	97	88	83	80	34	27	15	7	5	
Hr Total	310	248	301	349	377	415	307	190	115	92	59	25	
24 Hour Total :			5103										
AM Peak Hour Begins :			6:45	AM Peak Volume :				643	AM Peak Hour Factor :				0.85
PM Peak Hour Begins :			16:45	PM Peak Volume :				420	PM Peak Hour Factor :				0.91

Station Name: Branch Forbes Rd North of I-4 Ramps

Description: 72Hr Volume Counts ADR #126

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: Branch Forbes Rd North of I-4 Ramps - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	6	2	4	2	1	9	40	165	69	44	42	25	
30	9	6	2	3	6	12	96	107	30	45	36	47	
45	6	3	3	1	6	19	87	163	47	53	21	67	
00	3	3	5	4	10	31	126	95	58	41	33	52	
Hr Total	24	14	14	10	23	71	349	530	204	183	132	191	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	33	60	57	107	97	127	92	59	41	29	25	20	
30	51	55	54	92	101	117	63	62	30	22	19	6	
45	56	52	95	105	94	152	63	52	34	35	20	14	
00	64	69	112	88	120	133	51	50	40	33	12	13	
Hr Total	204	236	318	392	412	529	269	223	145	119	76	53	
24 Hour Total :		4721											
AM Peak Hour Begins :		6:45		AM Peak Volume :			561		AM Peak Hour Factor :			0.85	
PM Peak Hour Begins :		17:00		PM Peak Volume :			529		PM Peak Hour Factor :			0.87	

Date: 03/05/2020		Station Name: Branch Forbes Rd North of I-4 Ramps - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	5	7	3	3	10	33	77	158	65	51	37	50	
30	3	7	6	4	11	36	101	188	57	45	66	42	
45	8	4	5	9	12	69	154	150	74	48	55	67	
00	3	3	1	4	20	45	141	134	57	55	57	48	
Hr Total	19	21	15	20	53	183	473	630	253	199	215	207	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	67	65	74	96	96	126	82	61	41	26	20	15	
30	55	68	74	96	109	110	103	39	29	29	21	12	
45	65	61	75	83	124	134	80	55	20	19	21	7	
00	68	51	86	87	118	129	68	47	31	20	14	7	
Hr Total	255	245	309	362	447	499	333	202	121	94	76	41	
24 Hour Total :		5272											
AM Peak Hour Begins :		6:30		AM Peak Volume :			641		AM Peak Hour Factor :			0.85	
PM Peak Hour Begins :		17:00		PM Peak Volume :			499		PM Peak Hour Factor :			0.93	

Station Name: Branch Forbes Rd South of Glen Harwell Rd

Description: 72Hr Volume Counts ADR #121

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020	Station Name: Branch Forbes Rd South of Glen Harwell Rd - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0										
AM Peak Hour Begins :		0:00		AM Peak Volume :				0		AM Peak Hour Factor :		
PM Peak Hour Begins :		12:00		PM Peak Volume :				0		PM Peak Hour Factor :		

Date: 03/03/2020	Station Name: Branch Forbes Rd South of Glen Harwell Rd - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	33	22	12	29	30	77	300	313	303	310	219	264
30	31	29	23	24	39	138	296	329	331	362	261	235
45	26	9	13	39	76	159	347	348	311	281	252	245
0	24	20	19	36	71	212	346	334	318	256	247	249
Hr Total	114	80	67	128	216	586	1289	1324	1263	1209	979	993
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	284	241	322	335	363	370	325	258	175	124	132	50
30	254	294	337	320	377	424	336	264	196	178	106	55
45	250	334	301	327	298	383	258	219	182	173	78	46
0	270	293	331	333	319	326	242	204	131	127	83	30
Hr Total	1058	1162	1291	1315	1357	1503	1161	945	684	602	399	181
24 Hour Total :		19906										
AM Peak Hour Begins :		6:45		AM Peak Volume :				1336		AM Peak Hour Factor :		
PM Peak Hour Begins :		17:00		PM Peak Volume :				1503		PM Peak Hour Factor :		

Station Name: Branch Forbes Rd South of Glen Harwell Rd

Description: 72Hr Volume Counts ADR #121

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: Branch Forbes Rd South of Glen Harwell Rd - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	0	0	0	0	0	0	59	192	185	191	148	121	161
30	0	0	0	0	0	0	88	211	223	184	125	111	115
45	0	0	0	0	0	0	115	225	214	171	158	139	132
0	0	0	0	0	0	0	138	190	174	142	122	125	150
Hr Total	0	0	0	0	0	0	400	818	796	688	553	496	558
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	138	176	168	160	161	176	162	124	81	120	87	22	
30	133	155	169	185	172	205	121	111	83	113	57	20	
45	144	151	164	189	168	204	139	90	70	71	35	18	
0	136	184	181	175	192	172	117	94	74	97	24	15	
Hr Total	551	666	682	709	693	757	539	419	308	401	203	75	
24 Hour Total :			10312										
AM Peak Hour Begins :			6:30	AM Peak Volume :				823	AM Peak Hour Factor :				0.91
PM Peak Hour Begins :			16:45	PM Peak Volume :				777	PM Peak Hour Factor :				0.95

Date: 03/04/2020		Station Name: Branch Forbes Rd South of Glen Harwell Rd - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	34	19	15	24	35	27	87	113	127	94	150	150	
30	36	24	17	29	49	34	109	111	93	118	134	200	
45	32	22	24	36	63	45	140	119	110	124	133	157	
0	30	17	21	29	79	52	146	137	102	120	149	149	
Hr Total	132	82	77	118	226	158	482	480	432	456	566	656	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	147	143	135	0	0	0	0	0	0	0	0	0	
30	163	171	131	0	0	0	0	0	0	0	0	0	
45	170	138	0	0	0	0	0	0	0	0	0	0	
0	142	104	0	0	0	0	0	0	0	0	0	0	
Hr Total	622	556	266	0	0	0	0	0	0	0	0	0	
24 Hour Total :			5309										
AM Peak Hour Begins :			10:45	AM Peak Volume :				656	AM Peak Hour Factor :				0.82
PM Peak Hour Begins :			12:30	PM Peak Volume :				626	PM Peak Hour Factor :				0.92

Station Name: Branch Forbes Rd South of Glen Harwell Rd

Description: 72Hr Volume Counts ADR #121

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020	Station Name: Branch Forbes Rd South of Glen Harwell Rd - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	9	8	10	8	17	35	185	163	161	106	104	93
30	12	9	8	17	24	81	191	198	146	122	101	121
45	11	11	10	14	40	102	175	196	132	108	122	134
0	13	7	5	21	34	111	191	187	123	124	103	115
Hr Total	45	35	33	60	115	329	742	744	562	460	430	463
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	113	155	139	163	148	164	162	131	92	95	74	37
30	128	134	152	172	111	216	176	130	74	143	42	26
45	120	151	145	180	126	214	130	95	75	99	35	19
0	145	160	143	192	182	204	126	79	82	111	19	18
Hr Total	506	600	579	707	567	798	594	435	323	448	170	100
24 Hour Total :		9845										
AM Peak Hour Begins :		6:45		AM Peak Volume :			748		AM Peak Hour Factor :			0.94
PM Peak Hour Begins :		17:00		PM Peak Volume :			798		PM Peak Hour Factor :			0.92

Date: 03/05/2020	Station Name: Branch Forbes Rd South of Glen Harwell Rd - Southbound ***Hoses ripped up***											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0										
AM Peak Hour Begins :		0:00		AM Peak Volume :			0		AM Peak Hour Factor :			
PM Peak Hour Begins :		12:00		PM Peak Volume :			0		PM Peak Hour Factor :			

Station Name: Branch Forbes Rd South of I-4 Ramps

Description: 72Hr Volume Counts ADR #114

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: Branch Forbes Rd South of I-4 Ramps - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	19	8	11	24	26	79	194	210	189	158	125	149	
30	17	19	12	17	31	111	203	278	164	250	145	122	
45	13	13	7	26	63	137	223	302	161	211	140	128	
0	12	8	14	24	44	160	221	233	152	174	140	119	
Hr Total	61	48	44	91	164	487	841	1023	666	793	550	518	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	151	128	195	231	216	230	186	159	97	88	88	41	
30	132	173	213	201	184	267	192	157	118	117	71	32	
45	152	194	206	204	169	208	162	110	107	119	51	23	
0	150	168	189	212	219	192	129	99	74	76	40	19	
Hr Total	585	663	803	848	788	897	669	525	396	400	250	115	
24 Hour Total :		12225											
AM Peak Hour Begins :		7:00		AM Peak Volume :			1023		AM Peak Hour Factor :			0.85	
PM Peak Hour Begins :		16:45		PM Peak Volume :			924		PM Peak Hour Factor :			0.87	

Date: 03/03/2020		Station Name: Branch Forbes Rd South of I-4 Ramps - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	25	14	7	17	12	36	204	299	297	251	143	168	
30	19	10	17	9	25	43	224	206	316	229	175	165	
45	14	1	9	21	26	68	226	182	289	122	165	146	
0	13	7	10	16	36	86	228	183	281	123	163	199	
Hr Total	71	32	43	63	99	233	882	870	1183	725	646	678	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	167	181	201	178	242	240	211	161	116	78	60	35	
30	182	195	221	216	277	296	222	173	114	78	55	33	
45	139	188	164	208	185	223	181	146	100	84	39	25	
0	183	197	224	242	223	227	159	130	72	64	44	20	
Hr Total	671	761	810	844	927	986	773	610	402	304	198	113	
24 Hour Total :		12924											
AM Peak Hour Begins :		8:00		AM Peak Volume :			1183		AM Peak Hour Factor :			0.94	
PM Peak Hour Begins :		17:00		PM Peak Volume :			986		PM Peak Hour Factor :			0.83	

Station Name: Branch Forbes Rd South of I-4 Ramps

Description: 72Hr Volume Counts ADR #114

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020	Station Name: Branch Forbes Rd South of I-4 Ramps - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	15	12	5	15	19	86	213	214	225	165	131	169
30	16	16	10	24	41	110	234	274	199	144	117	134
45	26	11	15	23	60	141	255	241	187	152	159	159
00	11	8	14	26	50	151	236	186	162	136	143	152
Hr Total	68	47	44	88	170	488	938	915	773	597	550	614
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	154	206	186	221	208	211	197	150	99	152	102	29
30	143	173	198	215	198	227	171	126	113	124	75	28
45	166	170	215	223	223	240	171	107	86	104	42	22
00	159	204	215	201	249	213	152	116	85	127	33	22
Hr Total	622	753	814	860	878	891	691	499	383	507	252	101
24 Hour Total :			12543									
AM Peak Hour Begins :			6:30		AM Peak Volume :			979		AM Peak Hour Factor :		0.89
PM Peak Hour Begins :			16:45		PM Peak Volume :			927		PM Peak Hour Factor :		0.93

Date: 03/04/2020	Station Name: Branch Forbes Rd South of I-4 Ramps - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	26	13	13	10	11	30	117	141	155	138	172	210
30	18	16	10	12	23	49	149	144	126	139	167	217
45	20	13	11	16	21	62	173	169	146	155	146	174
00	22	11	7	15	40	73	166	183	107	161	197	188
Hr Total	86	53	41	53	95	214	605	637	534	593	682	789
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	174	227	169	225	251	272	188	176	110	75	76	31
30	222	190	207	225	301	225	198	176	98	67	56	40
45	195	168	230	213	261	236	201	150	73	81	55	33
00	193	152	240	224	243	221	209	145	93	63	40	19
Hr Total	784	737	846	887	1056	954	796	647	374	286	227	123
24 Hour Total :			12099									
AM Peak Hour Begins :			10:45		AM Peak Volume :			798		AM Peak Hour Factor :		0.92
PM Peak Hour Begins :			16:15		PM Peak Volume :			1077		PM Peak Hour Factor :		0.89

Station Name: Branch Forbes Rd South of I-4 Ramps

Description: 72Hr Volume Counts ADR #114

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020	Station Name: Branch Forbes Rd South of I-4 Ramps - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	18	15	8	13	27	62	215	231	201	148	141	120
30	20	12	12	24	31	106	235	260	181	147	122	150
45	13	13	14	16	60	132	215	243	155	141	150	154
0	17	14	6	27	42	155	223	214	151	150	120	154
Hr Total	68	54	40	80	160	455	888	948	688	586	533	578
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	143	187	189	207	199	221	194	146	121	115	96	49
30	159	159	192	219	155	263	218	137	91	169	52	33
45	163	200	188	231	179	255	180	117	89	123	46	22
0	168	190	182	232	230	237	159	99	99	130	29	28
Hr Total	633	736	751	889	763	976	751	499	400	537	223	132
24 Hour Total :			12368									
AM Peak Hour Begins :			6:45	AM Peak Volume :			957	AM Peak Hour Factor :			0.92	
PM Peak Hour Begins :			17:00	PM Peak Volume :			976	PM Peak Hour Factor :			0.93	

Date: 03/05/2020	Station Name: Branch Forbes Rd South of I-4 Ramps - Southbound ***Hose ripped up after 5:30pm***											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	29	18	3	8	17	42	119	188	159	135	147	172
30	25	15	14	12	17	43	132	146	136	182	146	162
45	22	21	19	15	23	76	181	172	143	176	164	188
00	22	9	11	17	38	82	199	172	138	187	169	184
Hr Total	98	63	47	52	95	243	631	678	576	680	626	706
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	184	177	204	251	226	294	2	0	4	1	1	1
30	158	166	175	228	228	221	4	1	0	2	3	2
45	185	167	235	236	254	268	3	3	2	2	0	1
00	167	177	232	202	297	61	3	4	1	3	2	2
Hr Total	694	687	846	917	1005	844	12	8	7	8	6	6
24 Hour Total :			9535									
AM Peak Hour Begins :			6:30	AM Peak Volume :			714	AM Peak Hour Factor :			0.90	
PM Peak Hour Begins :			16:45	PM Peak Volume :			1080	PM Peak Hour Factor :			0.91	

Station Name: Glen Harwell Rd West of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #342

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: Glen Harwell Rd West of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	2	0	0	3	2	1	6	10	9	11	4	5	
30	4	2	1	1	1	3	7	10	8	31	6	2	
45	0	1	2	2	4	5	7	11	13	18	5	2	
0	2	2	1	1	4	3	8	9	14	8	6	14	
Hr Total	8	5	4	7	11	12	28	40	44	68	21	23	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	12	10	8	8	9	11	9	9	9	6	3	4	
30	7	6	11	8	11	14	15	5	8	8	2	2	
45	8	10	10	8	7	9	8	14	11	7	3	1	
0	7	4	12	19	11	9	7	9	4	5	3	0	
Hr Total	34	30	41	43	38	43	39	37	32	26	11	7	
24 Hour Total :			652										
AM Peak Hour Begins :			8:45	AM Peak Volume :				74	AM Peak Hour Factor :				0.6
PM Peak Hour Begins :			15:30	PM Peak Volume :				47	PM Peak Hour Factor :				0.62

Date: 03/03/2020		Station Name: Glen Harwell Rd West of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	1	0	1	0	0	0	3	12	9	11	10	8	
30	3	2	1	1	0	2	11	9	11	16	8	3	
45	1	1	1	1	2	2	11	14	9	8	9	9	
0	0	1	0	0	0	3	8	15	7	5	12	4	
Hr Total	5	4	3	2	2	7	33	50	36	40	39	24	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	10	13	9	8	24	10	9	10	7	1	2	1	
30	8	6	6	10	14	11	11	3	6	2	0	3	
45	6	6	8	6	11	12	5	3	3	4	4	2	
0	7	4	8	21	19	20	9	8	2	0	1	1	
Hr Total	31	29	31	45	68	53	34	24	18	7	7	7	
24 Hour Total :			599										
AM Peak Hour Begins :			7:00	AM Peak Volume :				50	AM Peak Hour Factor :				0.78
PM Peak Hour Begins :			15:45	PM Peak Volume :				70	PM Peak Hour Factor :				0.73

Station Name: Glen Harwell Rd West of Branch Forbes Rd
 Description: 72Hr Volume Counts ADR #342
 City: Plant City
 County: Hillsborough
 Start Date/Time: 03/04/2020 00:00
 End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: Glen Harwell Rd West of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	2	1	0	3	1	3	7	3	3	4	8	11	
30	2	2	1	2	1	3	6	7	8	6	9	10	
45	5	3	4	1	4	6	4	10	21	2	7	4	
0	2	4	0	2	4	6	10	7	2	10	9	6	
Hr Total	11	10	5	8	10	18	27	27	34	22	33	31	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	7	6	8	5	9	8	9	5	9	11	2	4	
30	8	4	3	8	10	8	9	8	7	7	3	9	
45	12	5	4	7	8	14	5	11	16	6	5	2	
0	8	5	10	9	14	13	11	7	5	2	4	1	
Hr Total	35	20	25	29	41	43	34	31	37	26	14	16	
24 Hour Total :			587										
AM Peak Hour Begins :			7:45	AM Peak Volume :				39	AM Peak Hour Factor :				0.46
PM Peak Hour Begins :			17:30	PM Peak Volume :				45	PM Peak Hour Factor :				0.7

Date: 03/04/2020		Station Name: Glen Harwell Rd West of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	0	2	0	0	0	0	2	5	9	1	6	9	
30	1	0	0	1	0	0	8	8	8	10	6	4	
45	0	2	1	5	0	6	2	10	2	6	4	6	
0	1	1	1	0	3	2	6	3	6	8	8	11	
Hr Total	2	5	2	6	3	8	18	26	25	25	24	30	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	9	10	7	9	11	15	14	7	4	6	3	5	
30	12	3	12	4	20	19	9	4	5	5	1	4	
45	6	7	8	13	14	11	9	6	14	6	5	0	
0	5	8	17	8	11	11	13	12	8	5	0	0	
Hr Total	32	28	44	34	56	56	45	29	31	22	9	9	
24 Hour Total :			569										
AM Peak Hour Begins :			7:15		AM Peak Volume :			30		AM Peak Hour Factor :			0.68
PM Peak Hour Begins :			16:15		PM Peak Volume :			60		PM Peak Hour Factor :			0.75

Station Name: Glen Harwell Rd West of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #342

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: Glen Harwell Rd West of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	1	2	2	0	1	1	6	10	7	1	3	5	
30	4	0	1	1	1	0	8	5	5	10	9	10	
45	2	1	0	1	7	4	6	7	13	8	4	10	
0	2	0	0	3	1	4	9	8	7	8	5	9	
Hr Total	9	3	3	5	10	9	29	30	32	27	21	34	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	8	7	7	6	8	12	10	8	12	7	7	3	
30	8	8	8	4	17	11	18	4	4	10	5	1	
45	6	10	5	6	10	10	11	5	6	1	9	2	
0	7	6	4	5	11	11	17	4	8	6	1	4	
Hr Total	29	31	24	21	46	44	56	21	30	24	22	10	
24 Hour Total :			570										
AM Peak Hour Begins :			6:15	AM Peak Volume :				33	AM Peak Hour Factor :				0.63
PM Peak Hour Begins :			18:00	PM Peak Volume :				56	PM Peak Hour Factor :				0.78

Date: 03/05/2020		Station Name: Glen Harwell Rd West of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	0	3	1	1	2	0	4	9	9	4	4	12	
30	1	1	0	0	2	2	6	5	6	7	5	8	
45	2	1	0	1	1	4	7	10	6	6	6	4	
0	0	2	1	1	0	1	9	5	2	11	5	6	
Hr Total	3	7	2	3	5	7	26	29	23	28	20	30	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	8	7	5	11	13	13	14	8	4	3	2	1	
30	5	6	8	10	25	12	12	5	6	5	5	2	
45	9	6	10	11	27	18	12	9	3	2	4	0	
0	6	3	15	9	23	16	18	3	5	3	2	0	
Hr Total	28	22	38	41	88	59	56	25	18	13	13	3	
24 Hour Total :			587										
AM Peak Hour Begins :			6:45	AM Peak Volume :				33	AM Peak Hour Factor :				0.69
PM Peak Hour Begins :			16:00	PM Peak Volume :				88	PM Peak Hour Factor :				0.81

Station Name: I-4 EB -Off- Ramp to Branch Forbes Rd

Description: 72Hr Volume Counts ADR #324

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: I-4 EB -Off- Ramp to Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	14	10	6	10	6	18	184	159	172	198	86	101	
30	14	5	10	5	14	25	135	153	189	75	80	103	
45	5	7	4	9	20	47	181	205	207	67	93	99	
0	6	8	4	6	11	147	238	191	238	76	88	117	
Hr Total	39	30	24	30	51	237	738	708	806	416	347	420	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	92	97	106	117	122	134	92	98	64	45	31	14	
30	98	124	96	102	118	103	100	94	67	53	32	25	
45	97	98	95	121	107	105	87	74	40	40	23	14	
0	78	123	109	115	112	101	99	53	36	37	22	16	
Hr Total	365	442	406	455	459	443	378	319	207	175	108	69	
24 Hour Total :			7672										
AM Peak Hour Begins :			8:15	AM Peak Volume :			832	AM Peak Hour Factor :			0.87		
PM Peak Hour Begins :			15:30	PM Peak Volume :			476	PM Peak Hour Factor :			0.89		

Station Name: I-4 EB -Off- Ramp to Branch Forbes Rd

Description: 72Hr Volume Counts ADR #324

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: I-4 EB -Off- Ramp to Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	20	13	11	4	10	15	62	45	61	81	97	111	
30	12	7	4	6	17	27	68	60	58	108	95	132	
45	15	3	4	9	19	34	82	70	75	90	109	98	
0	8	4	3	5	19	42	55	67	47	89	106	92	
Hr Total	55	27	22	24	65	118	267	242	241	368	407	433	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	105	105	98	105	126	86	87	81	61	36	33	27	
30	112	98	99	96	115	89	101	102	48	44	30	24	
45	93	74	99	74	109	108	106	77	40	41	30	11	
0	98	70	97	96	114	85	97	56	44	36	13	21	
Hr Total	408	347	393	371	464	368	391	316	193	157	106	83	
24 Hour Total :			5866										
AM Peak Hour Begins :			10:30	AM Peak Volume :			458	AM Peak Hour Factor :			0.87		
PM Peak Hour Begins :			16:00	PM Peak Volume :			464	PM Peak Hour Factor :			0.92		

Station Name: I-4 EB -Off- Ramp to Branch Forbes Rd

Description: 72Hr Volume Counts ADR #324

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: I-4 EB -Off- Ramp to Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	21	8	3	4	7	20	62	55	63	82	89	99	
30	16	6	9	7	8	19	60	58	60	124	95	85	
45	12	7	8	4	17	35	95	68	82	115	97	98	
0	12	5	8	9	13	33	66	54	86	108	77	121	
Hr Total	61	26	28	24	45	107	283	235	291	429	358	403	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	91	104	109	91	96	90	94	56	59	31	46	24	
30	105	85	83	104	96	116	92	77	44	45	37	24	
45	83	82	99	98	98	100	81	78	53	39	29	18	
0	94	82	102	97	105	97	83	65	40	46	17	20	
Hr Total	373	353	393	390	395	403	350	276	196	161	129	86	
24 Hour Total :			5795										
AM Peak Hour Begins :			9:15	AM Peak Volume :			436	AM Peak Hour Factor :			0.88		
PM Peak Hour Begins :			16:45	PM Peak Volume :			411	PM Peak Hour Factor :			0.89		

Station Name: I-4 EB -On- Ramp from Branch Forbes

Description: 72Hr Volume Counts ADR #27

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: I-4 EB -On- Ramp from Branch Forbes - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15													
30													
45													
00													
Hr Total		0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15													
30													
45													
00													
Hr Total		0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :				0									
AM Peak Hour Begins :				AM Peak Volume :				AM Peak Hour Factor :					
PM Peak Hour Begins :				PM Peak Volume :				PM Peak Hour Factor :					

Station Name: I-4 EB -On- Ramp from Branch Forbes

Description: 72Hr Volume Counts ADR #27

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: I-4 EB -On- Ramp from Branch Forbes - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15													
30													
45													
00													
Hr Total		0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15													
30													
45													
00													
Hr Total		0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0											
AM Peak Hour Begins :					AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :					PM Peak Volume :			PM Peak Hour Factor :					

Station Name: I-4 EB -On- Ramp from Branch Forbes

Description: 72Hr Volume Counts ADR #27

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: I-4 EB -On- Ramp from Branch Forbes - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15													
30													
45													
00													
Hr Total		0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15													
30													
45													
00													
Hr Total		0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0											
AM Peak Hour Begins :					AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :					PM Peak Volume :			PM Peak Hour Factor :					

Station Name: I-4 WB - Off- Ramp to Branch Forbes Rd

Description: 72Hr Volume Counts ADR # 105

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: I-4 WB -Off- Ramp to Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	8	8	2	3	8	14	25	31	97	51	62	49	
30	9	5	8	2	8	18	26	24	64	46	74	52	
45	8	1	4	10	9	36	38	25	55	49	97	55	
0	8	1	5	9	11	39	30	26	27	49	64	61	
Hr Total	33	15	19	24	36	107	119	106	243	195	297	217	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	52	79	59	72	75	106	91	64	49	29	30	24	
30	68	63	68	78	91	116	83	76	57	42	18	16	
45	54	69	73	89	93	100	63	60	56	30	19	8	
0	68	63	87	68	86	100	53	61	41	27	17	7	
Hr Total	242	274	287	307	345	422	290	261	203	128	84	55	
24 Hour Total :			4309										
AM Peak Hour Begins :			10:00	AM Peak Volume :			297	AM Peak Hour Factor :			0.77		
PM Peak Hour Begins :			17:00	PM Peak Volume :			422	PM Peak Hour Factor :			0.91		

Station Name: I-4 WB - Off- Ramp to Branch Forbes Rd

Description: 72Hr Volume Counts ADR # 105

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: I-4 WB -Off- Ramp to Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	13	5	9	6	6	12	66	112	93	51	53	62	
30	4	5	5	3	3	15	77	106	46	49	50	79	
45	2	4	5	10	5	28	110	89	46	55	47	52	
00	10	4	2	3	15	44	103	122	40	64	56	65	
Hr Total	29	18	21	22	29	99	356	429	225	219	206	258	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	59	75	82	125	145	117	80	60	50	39	29	14	
30	61	65	81	107	154	125	106	68	35	35	31	15	
45	68	70	122	147	146	116	85	64	45	40	27	11	
00	64	69	108	145	179	88	61	69	53	36	17	10	
Hr Total	252	279	393	524	624	446	332	261	183	150	104	50	
24 Hour Total :		5509											
AM Peak Hour Begins :		6:30		AM Peak Volume :			431	AM Peak Hour Factor :			0.88		
PM Peak Hour Begins :		16:00		PM Peak Volume :			624	PM Peak Hour Factor :			0.87		

Station Name: I-4 WB - Off- Ramp to Branch Forbes Rd

Description: 72Hr Volume Counts ADR # 105

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: I-4 WB -Off- Ramp to Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	10	6	5	5	7	13	68	175	86	38	44	56	
30	12	5	5	4	8	16	86	87	44	55	39	68	
45	14	15	3	5	7	39	87	166	50	52	57	65	
00	7	5	3	10	11	45	112	115	42	51	53	56	
Hr Total	43	31	16	24	33	113	353	543	222	196	193	245	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	43	62	67	154	99	122	108	55	46	34	30	23	
30	41	63	84	111	117	132	77	71	44	38	18	14	
45	71	65	141	116	109	116	69	65	59	47	29	8	
00	75	75	146	93	114	114	66	69	55	34	27	10	
Hr Total	230	265	438	474	439	484	320	260	204	153	104	55	
24 Hour Total :			5438										
AM Peak Hour Begins :			7:00	AM Peak Volume :			543	AM Peak Hour Factor :			0.78		
PM Peak Hour Begins :			14:30	PM Peak Volume :			552	PM Peak Hour Factor :			0.90		

Station Name: I-4 WB -On- Ramp from Branch Forbes Rd

Description: 72Hr Volume Counts ADR #65

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020		Station Name: I-4 WB -On- Ramp from Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	12	1	6	9	19	52	167	219	186	105	73	90	
30	12	8	10	8	15	88	188	259	178	97	79	66	
45	6	7	3	15	41	106	202	305	179	69	87	83	
00	9	9	7	18	34	142	212	230	122	97	84	62	
Hr Total	39	25	26	50	109	388	769	1013	665	368	323	301	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	83	99	102	127	100	100	76	81	49	39	62	20	
30	60	96	110	122	80	131	84	72	51	70	46	19	
45	75	112	103	139	91	98	89	53	57	82	24	12	
00	96	97	112	103	103	93	47	56	41	59	26	13	
Hr Total	314	404	427	491	374	422	296	262	198	250	158	64	
24 Hour Total :			7736										
AM Peak Hour Begins :			7:00	AM Peak Volume :			1013	AM Peak Hour Factor :			0.83		
PM Peak Hour Begins :			14:45	PM Peak Volume :			500	PM Peak Hour Factor :			0.9		

Station Name: I-4 WB -On- Ramp from Branch Forbes Rd

Description: 72Hr Volume Counts ADR #65

City: Pant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: I-4 WB -On- Ramp from Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	16	6	4	9	12	58	169	224	127	84	88	74	
30	7	6	10	12	23	91	192	257	107	89	79	82	
45	18	7	8	8	30	101	212	241	90	93	74	79	
0	3	4	3	10	35	124	206	148	109	76	68	86	
Hr Total	44	23	25	39	100	374	779	870	433	342	309	321	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	80	138	112	125	103	95	71	57	49	83	74	21	
30	93	96	113	131	97	104	74	54	44	79	47	12	
45	81	86	110	122	99	113	66	48	42	64	32	18	
0	89	120	131	105	111	83	63	43	47	74	23	11	
Hr Total	343	440	466	483	410	395	274	202	182	300	176	62	
24 Hour Total :			7392										
AM Peak Hour Begins :			6:45	AM Peak Volume :			928	AM Peak Hour Factor :			0.9		
PM Peak Hour Begins :			14:45	PM Peak Volume :			509	PM Peak Hour Factor :			0.92		

Station Name: I-4 WB -On- Ramp from Branch Forbes Rd

Description: 72Hr Volume Counts ADR #65

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: I-4 WB -On- Ramp from Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	13	6	6	12	16	51	171	231	109	83	76	59	
30	7	7	10	10	21	81	185	269	81	82	66	61	
45	9	11	8	10	35	111	196	242	90	78	96	75	
0	10	4	5	16	35	135	199	162	81	93	64	91	
Hr Total	39	28	29	48	107	378	751	904	361	336	302	286	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	84	104	105	133	124	108	97	59	55	70	65	19	
30	95	103	116	133	111	154	98	68	52	111	34	16	
45	79	116	108	133	106	138	81	62	52	101	30	13	
0	107	114	113	136	120	127	70	51	49	82	15	8	
Hr Total	365	437	442	535	461	527	346	240	208	364	144	56	
24 Hour Total :			7694										
AM Peak Hour Begins :			6:45	AM Peak Volume :			941	AM Peak Hour Factor :			0.87		
PM Peak Hour Begins :			15:00	PM Peak Volume :			535	PM Peak Hour Factor :			0.87		

Station Name: N Branch Forbes Rd South of US 92

Description: 72Hr Volume Counts ADR #358

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020	Station Name: Branch Forbes Rd South of US 92 - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	11	5	3	5	16	36	73	117	116	62	16	2
30	5	1	1	7	16	50	89	142	90	42	3	0
45	2	3	4	5	15	67	108	107	80	24	0	0
0	3	2	4	12	17	79	116	100	60	15	0	1
Hr Total	21	11	12	29	64	232	386	466	346	143	19	3
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	0	6	0	1	1	1	1	0	0	0	0	0
30	0	3	3	0	3	0	0	1	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0
Hr Total	0	9	3	1	4	2	1	1	0	0	0	0
24 Hour Total :		1753										
AM Peak Hour Begins :		6:30		AM Peak Volume :			483		AM Peak Hour Factor :			0.85
PM Peak Hour Begins :		12:30		PM Peak Volume :			9		PM Peak Hour Factor :			0.38

Date: 03/03/2020	Station Name: Branch Forbes Rd South of US 92 - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	9	4	3	2	3	9	27	61	70	127	102	120
30	6	5	4	2	5	13	41	55	70	129	109	90
45	5	0	1	4	6	22	74	74	52	121	117	93
0	5	1	8	3	11	27	73	53	72	84	116	109
Hr Total	25	10	16	11	25	71	215	243	264	461	444	412
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	104	122	135	190	199	211	166	116	87	69	44	16
30	93	119	175	168	164	228	173	96	95	59	35	21
45	124	117	138	196	164	165	117	102	69	46	47	15
0	100	134	147	172	209	182	139	79	56	55	27	11
Hr Total	421	492	595	726	736	786	595	393	307	229	153	63
24 Hour Total :		7693										
AM Peak Hour Begins :		10:15		AM Peak Volume :			462		AM Peak Hour Factor :			0.9
PM Peak Hour Begins :		16:45		PM Peak Volume :			813		PM Peak Hour Factor :			0.89

Station Name: N Branch Forbes Rd South of US 92

Description: 72Hr Volume Counts ADR #358

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: Branch Forbes Rd South of US 92 - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	0	0	0	0	0	37	88	118	118	51	43	55	
30	0	0	0	0	0	51	114	124	104	77	64	58	
45	0	0	0	0	0	56	103	94	79	61	73	54	
0	0	0	0	0	25	71	115	112	68	73	73	77	
Hr Total	0	0	0	0	25	215	420	448	369	262	253	244	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	57	73	72	92	97	94	74	52	41	44	22	6	
30	58	81	97	100	66	98	59	40	28	17	18	9	
45	69	67	69	94	102	80	46	51	22	34	11	9	
0	50	71	72	76	105	85	60	31	30	24	9	8	
Hr Total	234	292	310	362	370	357	239	174	121	119	60	32	
24 Hour Total :			4906										
AM Peak Hour Begins :			6:30	AM Peak Volume :				460	AM Peak Hour Factor :				0.93
PM Peak Hour Begins :			16:30	PM Peak Volume :				399	PM Peak Hour Factor :				0.95

Date: 03/04/2020		Station Name: Branch Forbes Rd South of US 92 - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	15	10	9	11	16	13	40	56	43	50	78	76	
30	14	11	6	12	18	16	45	62	56	48	49	81	
45	13	8	10	8	25	14	67	59	72	68	55	50	
0	7	8	5	13	17	29	61	75	68	58	80	66	
Hr Total	49	37	30	44	76	72	213	252	239	224	262	273	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	59	90	81	83	87	118	86	52	48	36	35	16	
30	75	87	69	79	109	112	80	83	34	32	22	15	
45	70	78	77	105	87	114	84	57	26	34	23	6	
0	65	64	73	113	111	104	68	53	36	24	15	6	
Hr Total	269	319	300	380	394	448	318	245	144	126	95	43	
24 Hour Total :			4852										
AM Peak Hour Begins :			10:30	AM Peak Volume :				292	AM Peak Hour Factor :				0.9
PM Peak Hour Begins :			16:45	PM Peak Volume :				455	PM Peak Hour Factor :				0.96

Station Name: N Branch Forbes Rd South of US 92

Description: 72Hr Volume Counts ADR #358

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: Branch Forbes Rd South of US 92 - Northbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	8	4	4	9	10	30	94	132	128	63	49	63	
30	3	4	1	7	16	51	104	131	70	63	51	52	
45	7	5	5	10	18	68	120	112	69	62	64	49	
0	4	2	1	15	14	68	116	113	64	55	45	63	
Hr Total	22	15	11	41	58	217	434	488	331	243	209	227	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	57	55	63	99	130	104	82	56	30	35	24	14	
30	69	58	70	85	80	122	58	51	39	22	17	11	
45	71	84	63	74	109	100	69	37	34	24	6	8	
0	55	72	80	96	98	66	64	41	28	20	22	7	
Hr Total	252	269	276	354	417	392	273	185	131	101	69	40	
24 Hour Total :		5055											
AM Peak Hour Begins :		6:30		AM Peak Volume :				499	AM Peak Hour Factor :				0.95
PM Peak Hour Begins :		16:30		PM Peak Volume :				433	PM Peak Hour Factor :				0.83

Date: 03/05/2020		Station Name: Branch Forbes Rd South of US 92 - Southbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	13	7	3	1	6	12	38	68	70	46	39	61	
30	13	8	4	2	4	7	49	53	57	77	63	53	
45	4	6	4	5	7	32	72	60	59	64	62	72	
0	5	0	5	2	11	36	62	68	41	71	56	64	
Hr Total	35	21	16	10	28	87	221	249	227	258	220	250	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	54	68	65	93	61	105	93	57	39	27	29	19	
30	70	49	66	81	45	96	94	59	37	36	15	16	
45	59	65	95	93	85	96	57	52	58	34	21	12	
0	72	76	96	78	104	103	57	65	38	39	20	15	
Hr Total	255	258	322	345	295	400	301	233	172	136	85	62	
24 Hour Total :		4486											
AM Peak Hour Begins :		9:00		AM Peak Volume :				258	AM Peak Hour Factor :				0.84
PM Peak Hour Begins :		16:45		PM Peak Volume :				401	PM Peak Hour Factor :				0.95

Station Name: US 92 East of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #112

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020	Station Name: US 92 East of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :	0											
AM Peak Hour Begins :				AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :				PM Peak Volume :			PM Peak Hour Factor :					

Date: 03/03/2020	Station Name: US 92 East of Branch Forbes Rd -Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :	0											
AM Peak Hour Begins :				AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :				PM Peak Volume :			PM Peak Hour Factor :					

Station Name: US 92 East of Branch Forbes Rd
 Description: 72Hr Volume Counts ADR #112
 City: Plant City
 County: Hillsborough
 Start Date/Time: 03/04/2020 00:00
 End Date/Time: 03/05/2020 00:00

Date: 03/04/2020	Station Name: US 92 East of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :	0											
AM Peak Hour Begins :				AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :				PM Peak Volume :			PM Peak Hour Factor :					

Date: 03/04/2020	Station Name: US 92 East of Branch Forbes Rd -Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15												
30												
45												
00												
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :	0											
AM Peak Hour Begins :				AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :				PM Peak Volume :			PM Peak Hour Factor :					

Station Name: US 92 East of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #112

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020		Station Name: US 92 East of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15													
30													
45													
00													
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15													
30													
45													
00													
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0											
AM Peak Hour Begins :					AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :					PM Peak Volume :			PM Peak Hour Factor :					

Date: 03/05/2020		Station Name: US 92 East of Branch Forbes Rd -Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15													
30													
45													
00													
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0	0
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15													
30													
45													
00													
Hr Total	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Hour Total :		0											
AM Peak Hour Begins :					AM Peak Volume :			AM Peak Hour Factor :					
PM Peak Hour Begins :					PM Peak Volume :			PM Peak Hour Factor :					

Station Name: US 92 West of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #74

City: Plant City

County: Hillsborough

Start Date/Time: 03/03/2020 00:00

End Date/Time: 03/04/2020 00:00

Date: 03/03/2020	Station Name: US 92 West of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	8	10	3	11	7	17	68	191	176	203	84	79
30	4	3	9	2	8	22	146	157	197	205	81	70
45	4	3	5	7	12	27	178	147	195	130	84	76
0	5	8	5	3	15	47	159	176	179	85	87	79
Hr Total	21	24	22	23	42	113	551	671	747	623	336	304
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	101	73	128	86	141	166	162	96	47	34	17	7
30	117	99	93	111	108	125	118	57	69	35	9	9
45	91	70	86	121	126	140	102	61	72	33	19	8
0	64	84	119	152	128	153	137	50	42	21	13	6
Hr Total	373	326	426	470	503	584	519	264	230	123	58	30
24 Hour Total :		7383										
AM Peak Hour Begins :		8:30		AM Peak Volume :			782		AM Peak Hour Factor :			0.95
PM Peak Hour Begins :		17:00		PM Peak Volume :			584		PM Peak Hour Factor :			0.88

Date: 03/03/2020	Station Name: US 92 West of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	6	3	5	4	17	73	109	121	118	86	67
30	8	9	6	5	6	22	88	118	132	137	80	65
45	5	4	5	6	6	38	106	93	106	70	85	77
0	5	6	4	6	16	55	120	118	95	70	69	80
Hr Total	22	25	18	22	32	132	387	438	454	395	320	289
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	77	82	78	71	89	73	95	64	61	55	39	18
30	89	87	72	85	101	92	67	56	44	35	33	23
45	56	58	107	87	99	88	57	59	47	44	12	9
0	74	80	78	89	82	85	63	56	53	47	17	8
Hr Total	296	307	335	332	371	338	282	235	205	181	101	58
24 Hour Total :		5575										
AM Peak Hour Begins :		7:45		AM Peak Volume :			477		AM Peak Hour Factor :			0.87
PM Peak Hour Begins :		15:45		PM Peak Volume :			378		PM Peak Hour Factor :			0.88

Station Name: US 92 West of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #74

City: Plant City

County: Hillsborough

Start Date/Time: 03/04/2020 00:00

End Date/Time: 03/05/2020 00:00

Date: 03/04/2020		Station Name: US 92 West of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	5	5	2	4	11	16	47	70	95	85	83	91	
30	7	6	2	2	6	17	47	84	89	76	72	97	
45	7	3	3	9	13	32	55	93	96	99	83	70	
0	2	5	3	12	10	42	52	89	85	96	85	81	
Hr Total	21	19	10	27	40	107	201	336	365	356	323	339	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	71	135	93	96	150	165	153	99	42	35	17	7	
30	81	83	91	127	146	161	169	67	62	37	14	13	
45	86	76	97	109	137	142	137	63	43	28	17	10	
0	102	74	87	144	108	169	121	49	36	32	14	7	
Hr Total	340	368	368	476	541	637	580	278	183	132	62	37	
24 Hour Total :			6146										
AM Peak Hour Begins :			7:45	AM Peak Volume :				369	AM Peak Hour Factor :				0.93
PM Peak Hour Begins :			17:00	PM Peak Volume :				637	PM Peak Hour Factor :				0.94

Date: 03/04/2020		Station Name: US 92 West of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11	
15	8	10	2	2	9	20	69	112	96	75	52	69	
30	3	3	3	3	6	24	86	113	72	65	72	66	
45	4	6	4	7	4	40	92	98	78	77	58	67	
0	9	4	4	5	16	51	107	124	45	69	57	95	
Hr Total	24	23	13	17	35	135	354	447	291	286	239	297	
End Time	12	13	14	15	16	17	18	19	20	21	22	23	
15	94	83	90	94	101	93	64	62	56	47	77	8	
30	85	81	77	108	97	82	81	66	56	48	46	12	
45	86	88	98	111	88	60	73	48	44	28	27	9	
0	86	89	110	103	106	100	68	59	48	60	20	9	
Hr Total	351	341	375	416	392	335	286	235	204	183	170	38	
24 Hour Total :			5487										
AM Peak Hour Begins :			7:00	AM Peak Volume :				447	AM Peak Hour Factor :				0.9
PM Peak Hour Begins :			14:45	PM Peak Volume :				423	PM Peak Hour Factor :				0.95

Station Name: US 92 West of Branch Forbes Rd

Description: 72Hr Volume Counts ADR #74

City: Plant City

County: Hillsborough

Start Date/Time: 03/05/2020 00:00

End Date/Time: 03/06/2020 00:00

Date: 03/05/2020	Station Name: US 92 West of Branch Forbes Rd - Eastbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	4	2	6	9	12	49	75	89	68	79	62
30	8	2	4	4	5	20	55	90	118	78	91	95
45	7	5	3	3	14	20	62	102	98	90	78	90
0	5	6	4	4	14	36	56	114	90	105	99	89
Hr Total	22	17	13	17	42	88	222	381	395	341	347	336
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	68	80	92	112	177	171	151	86	47	42	21	14
30	64	81	91	95	139	165	148	90	39	39	22	12
45	78	61	88	128	142	168	123	90	34	34	18	9
0	64	89	107	168	123	150	137	31	38	26	10	9
Hr Total	274	311	378	503	581	654	559	297	158	141	71	44
24 Hour Total :		6192										
AM Peak Hour Begins :		7:30		AM Peak Volume :			423		AM Peak Hour Factor :			0.9
PM Peak Hour Begins :		17:00		PM Peak Volume :			654		PM Peak Hour Factor :			0.92

Date: 03/05/2020	Station Name: US 92 West of Branch Forbes Rd - Westbound											
End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	10	3	6	1	7	20	81	138	122	68	72	73
30	8	6	2	4	5	23	99	111	96	57	71	77
45	8	2	4	5	5	30	94	100	72	57	80	73
0	7	4	5	11	18	55	117	121	74	49	67	88
Hr Total	33	15	17	21	35	128	391	470	364	231	290	311
End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	75	80	82	108	102	108	105	58	45	53	41	20
30	79	86	90	97	131	104	93	44	35	69	44	10
45	81	69	91	102	126	88	69	58	34	47	24	14
0	76	63	121	107	92	93	67	58	50	48	15	4
Hr Total	311	298	384	414	451	393	334	218	164	217	124	48
24 Hour Total :		5662										
AM Peak Hour Begins :		7:00		AM Peak Volume :			470		AM Peak Hour Factor :			0.85
PM Peak Hour Begins :		15:45		PM Peak Volume :			466		PM Peak Hour Factor :			0.89

Branch Forbes Road

*Rounding based on guidelines on 2019 FDOT Project Traffic Forecasting Handbook Section 1.6.

APPENDIX C Existing (2020) Operational Analysis

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	5	2	33	55	3	7	116	232	39	13	413	4
Future Vol, veh/h	5	2	33	55	3	7	116	232	39	13	413	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	2	35	58	3	7	122	244	41	14	435	4
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	979	994	437	993	976	265	439	0	0	285	0	0
Stage 1	465	465	-	509	509	-	-	-	-	-	-	-
Stage 2	514	529	-	484	467	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	226	242	613	221	248	766	1105	-	-	1260	-	-
Stage 1	572	558	-	541	533	-	-	-	-	-	-	-
Stage 2	538	522	-	558	557	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	197	207	613	184	212	766	1105	-	-	1260	-	-
Mov Cap-2 Maneuver	197	207	-	184	212	-	-	-	-	-	-	-
Stage 1	496	550	-	470	463	-	-	-	-	-	-	-
Stage 2	459	453	-	516	549	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	13.8		31.7		2.6		0.2					
HCM LOS	B		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1105	-	-	450	202	1260	-	-				
HCM Lane V/C Ratio	0.111	-	-	0.094	0.339	0.011	-	-				
HCM Control Delay (s)	8.7	0	-	13.8	31.7	7.9	0	-				
HCM Lane LOS	A	A	-	B	D	A	A	-				
HCM 95th %tile Q(veh)	0.4	-	-	0.3	1.4	0	-	-				

HCM 6th TWSC

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

Intersection												
Int Delay, s/veh	115.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	140	7	203	582	184	0	0	301	200
Future Vol, veh/h	0	0	0	140	7	203	582	184	0	0	301	200
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	Yield
Storage Length	-	-	-	-	-	1000	80	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	0	147	7	214	613	194	0	0	317	211
Major/Minor				Minor1		Major1		Major2				
Conflicting Flow All				1737	1737	194	317	0	-	-	-	0
Stage 1				1420	1420	-	-	-	-	-	-	-
Stage 2				317	317	-	-	-	-	-	-	-
Critical Hdwy				6.45	6.55	6.25	4.15	-	-	-	-	-
Critical Hdwy Stg 1				5.45	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2				5.45	5.55	-	-	-	-	-	-	-
Follow-up Hdwy				3.545	4.045	3.345	2.245	-	-	-	-	-
Pot Cap-1 Maneuver				~ 94	86	840	1226	-	0	0	-	-
Stage 1				220	200	-	-	-	0	0	-	-
Stage 2				732	649	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver				~ 47	0	840	1226	-	-	-	-	-
Mov Cap-2 Maneuver				~ 47	0	-	-	-	-	-	-	-
Stage 1				~ 110	0	-	-	-	-	-	-	-
Stage 2				732	0	-	-	-	-	-	-	-
Approach				WB		NB		SB				
HCM Control Delay, s				\$ 515.8		8.2		0				
HCM LOS				F								
Minor Lane/Major Mvmt	NBL	NBT	WBLn1	WBLn2	SBT	SBR						
Capacity (veh/h)	1226	-	47	840	-	-						
HCM Lane V/C Ratio	0.5	-	3.292	0.254	-	-						
HCM Control Delay (s)	10.8	\$	1213.4	10.7	-	-						
HCM Lane LOS	B	-	F	B	-	-						
HCM 95th %tile Q(veh)	2.9	-	16.9	1	-	-						
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon						

HCM 6th TWSC

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

Intersection												
Int Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕						↕		↕	↕	
Traffic Vol, veh/h	65	5	430	0	0	0	0	701	300	84	357	0
Future Vol, veh/h	65	5	430	0	0	0	0	701	300	84	357	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	68	5	453	0	0	0	0	738	316	88	376	0
Major/Minor	Minor2						Major1		Major2			
Conflicting Flow All	1290	1290	376				-	0	0	738	0	0
Stage 1	552	552	-				-	-	-	-	-	-
Stage 2	738	738	-				-	-	-	-	-	-
Critical Hdwy	6.45	6.55	6.25				-	-	-	4.15	-	-
Critical Hdwy Stg 1	5.45	5.55	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.45	5.55	-				-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345				-	-	-	2.245	-	-
Pot Cap-1 Maneuver	178	161	664				0	-	-	855	-	0
Stage 1	571	510	-				0	-	-	-	-	0
Stage 2	467	420	-				0	-	-	-	-	0
Platoon blocked, %							-	-	-			
Mov Cap-1 Maneuver	160	0	664				-	-	-	855	-	-
Mov Cap-2 Maneuver	160	0	-				-	-	-	-	-	-
Stage 1	571	0	-				-	-	-	-	-	-
Stage 2	419	0	-				-	-	-	-	-	-
Approach	EB						NB		SB			
HCM Control Delay, s	19						0		1.8			
HCM LOS	C											
Minor Lane/Major Mvmt		NBT	NBR	EBLn1	SBL	SBT						
Capacity (veh/h)		-	-	772	855	-						
HCM Lane V/C Ratio		-	-	0.682	0.103	-						
HCM Control Delay (s)		-	-	19	9.7	-						
HCM Lane LOS		-	-	C	A	-						
HCM 95th %tile Q(veh)		-	-	5.5	0.3	-						

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	14											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	13	32	4	6	50	9	916	9	31	732	24
Future Vol, veh/h	35	13	32	4	6	50	9	916	9	31	732	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	37	14	34	4	6	53	9	964	9	33	771	25
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1866	1841	784	1861	1849	969	796	0	0	973	0	0
Stage 1	850	850	-	987	987	-	-	-	-	-	-	-
Stage 2	1016	991	-	874	862	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	56	75	393	55	73	304	813	-	-	697	-	-
Stage 1	355	377	-	294	322	-	-	-	-	-	-	-
Stage 2	287	324	-	340	368	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	39	67	393	39	65	304	813	-	-	697	-	-
Mov Cap-2 Maneuver	39	67	-	39	65	-	-	-	-	-	-	-
Stage 1	346	345	-	287	314	-	-	-	-	-	-	-
Stage 2	227	316	-	273	337	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	291.5		39.1		0.1		0.4					
HCM LOS	F		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	813	-	-	68	167	697	-	-				
HCM Lane V/C Ratio	0.012	-	-	1.238	0.378	0.047	-	-				
HCM Control Delay (s)	9.5	0	-	291.5	39.1	10.4	0	-				
HCM Lane LOS	A	A	-	F	E	B	A	-				
HCM 95th %tile Q(veh)	0	-	-	6.7	1.6	0.1	-	-				

HCM 6th Signalized Intersection Summary 14: N Forbes Rd/Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	264	18	25	407	398	43	378	9	276	300	192
Future Volume (veh/h)	158	264	18	25	407	398	43	378	9	276	300	192
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	166	278	19	26	428	419	45	398	9	291	316	202
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	211	804	55	419	278	272	271	410	9	223	696	589
Arrive On Green	0.08	0.48	0.48	0.33	0.33	0.33	0.23	0.23	0.23	0.08	0.38	0.38
Sat Flow, veh/h	1739	1690	115	1057	847	829	862	1778	40	1739	1826	1547
Grp Volume(v), veh/h	166	0	297	26	0	847	45	0	407	291	316	202
Grp Sat Flow(s),veh/h/ln	1739	0	1805	1057	0	1677	862	0	1819	1739	1826	1547
Q Serve(g_s), s	6.0	0.0	10.3	1.7	0.0	32.7	4.2	0.0	22.1	8.2	12.9	9.3
Cycle Q Clear(g_c), s	6.0	0.0	10.3	1.7	0.0	32.7	4.2	0.0	22.1	8.2	12.9	9.3
Prop In Lane	1.00		0.06	1.00		0.49	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	211	0	859	419	0	550	271	0	419	223	696	589
V/C Ratio(X)	0.79	0.00	0.35	0.06	0.00	1.54	0.17	0.00	0.97	1.30	0.45	0.34
Avail Cap(c_a), veh/h	215	0	863	419	0	550	271	0	419	223	696	589
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.1	0.0	16.4	23.1	0.0	33.5	31.2	0.0	38.0	31.2	23.1	22.0
Incr Delay (d2), s/veh	17.2	0.0	0.3	0.1	0.0	252.5	1.3	0.0	37.2	164.7	2.1	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.9	0.0	7.1	0.7	0.0	78.3	1.7	0.0	19.7	22.3	9.7	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.3	0.0	16.7	23.2	0.0	286.0	32.5	0.0	75.2	195.9	25.3	23.6
LnGrp LOS	D	A	B	C	A	F	C	A	E	F	C	C
Approach Vol, veh/h	463		873				452		809			
Approach Delay, s/veh	25.5		278.2				71.0		86.2			
Approach LOS	C		F				E		F			
Timer - Assigned Phs	1	2	3	4	6		8					
Phs Duration (G+Y+Rc), s	14.8	40.0	15.0	30.0	54.8		45.0					
Change Period (Y+Rc), s	6.8	7.3	6.8	7.0	7.3		7.0					
Max Green Setting (Gmax), s	8.2	32.7	8.2	23.0	47.7		38.0					
Max Q Clear Time (g_c+I1), s	8.0	34.7	10.2	24.1	12.3		14.9					
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	2.1		2.5					
Intersection Summary												
HCM 6th Ctrl Delay	137.3											
HCM 6th LOS	F											

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	16	0	34	31	2	12	103	304	21	6	276	9
Future Vol, veh/h	16	0	34	31	2	12	103	304	21	6	276	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	17	0	36	33	2	13	108	320	22	6	291	9
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	863	866	296	873	859	331	300	0	0	342	0	0
Stage 1	308	308	-	547	547	-	-	-	-	-	-	-
Stage 2	555	558	-	326	312	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	272	288	736	267	291	704	1244	-	-	1200	-	-
Stage 1	696	655	-	516	513	-	-	-	-	-	-	-
Stage 2	511	507	-	680	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	242	255	736	232	258	704	1244	-	-	1200	-	-
Mov Cap-2 Maneuver	242	255	-	232	258	-	-	-	-	-	-	-
Stage 1	621	651	-	460	458	-	-	-	-	-	-	-
Stage 2	446	452	-	643	648	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	14.2		20.2		2		0.2					
HCM LOS	B		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1244	-	-	445	284	1200	-	-				
HCM Lane V/C Ratio	0.087	-	-	0.118	0.167	0.005	-	-				
HCM Control Delay (s)	8.2	0	-	14.2	20.2	8	0	-				
HCM Lane LOS	A	A	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.3	-	-	0.4	0.6	0	-	-				

HCM 6th TWSC

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

Intersection												
Int Delay, s/veh	103.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	257	2	191	340	237	0	0	259	82
Future Vol, veh/h	0	0	0	257	2	191	340	237	0	0	259	82
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	Yield
Storage Length	-	-	-	-	-	1000	80	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	0	271	2	201	358	249	0	0	273	86
Major/Minor				Minor1		Major1		Major2				
Conflicting Flow All				1238	1238	249	273	0	-	-	-	0
Stage 1				965	965	-	-	-	-	-	-	-
Stage 2				273	273	-	-	-	-	-	-	-
Critical Hdwy				6.45	6.55	6.25	4.15	-	-	-	-	-
Critical Hdwy Stg 1				5.45	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2				5.45	5.55	-	-	-	-	-	-	-
Follow-up Hdwy				3.545	4.045	3.345	2.245	-	-	-	-	-
Pot Cap-1 Maneuver				~ 191	173	782	1273	-	0	0	-	-
Stage 1				365	329	-	-	-	0	0	-	-
Stage 2				766	678	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver				~ 137	0	782	1273	-	-	-	-	-
Mov Cap-2 Maneuver				~ 137	0	-	-	-	-	-	-	-
Stage 1				~ 262	0	-	-	-	-	-	-	-
Stage 2				766	0	-	-	-	-	-	-	-
Approach				WB		NB		SB				
HCM Control Delay, s				\$ 306.6		5.3		0				
HCM LOS				F								
Minor Lane/Major Mvmt		NBL	NBT	WBLn1	WBLn2	SBT	SBR					
Capacity (veh/h)		1273	-	137	782	-	-					
HCM Lane V/C Ratio		0.281	-	1.99	0.257	-	-					
HCM Control Delay (s)		8.9	-	\$ 524.5	11.2	-	-					
HCM Lane LOS		A	-	F	B	-	-					
HCM 95th %tile Q(veh)		1.2	-	21.7	1	-	-					
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s				+: Computation Not Defined			*: All major volume in platoon			

HCM 6th TWSC

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

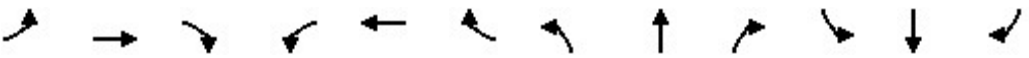
Intersection												
Int Delay, s/veh	39.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕						↗		↖	↗	
Traffic Vol, veh/h	95	3	532	0	0	0	0	482	283	73	443	0
Future Vol, veh/h	95	3	532	0	0	0	0	482	283	73	443	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	100	3	560	0	0	0	0	507	298	77	466	0
Major/Minor	Minor2						Major1		Major2			
Conflicting Flow All	1127	1127	466				-	0	0	507	0	0
Stage 1	620	620	-				-	-	-	-	-	-
Stage 2	507	507	-				-	-	-	-	-	-
Critical Hdwy	6.45	6.55	6.25				-	-	-	4.15	-	-
Critical Hdwy Stg 1	5.45	5.55	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.45	5.55	-				-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345				-	-	-	2.245	-	-
Pot Cap-1 Maneuver	223	202	590				0	-	-	1043	-	0
Stage 1	531	475	-				0	-	-	-	-	0
Stage 2	599	534	-				0	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	206	0	590				-	-	-	1043	-	-
Mov Cap-2 Maneuver	206	0	-				-	-	-	-	-	-
Stage 1	531	0	-				-	-	-	-	-	-
Stage 2	555	0	-				-	-	-	-	-	-
Approach	EB						NB		SB			
HCM Control Delay, s	119.6						0		1.2			
HCM LOS	F											
Minor Lane/Major Mvmt		NBT	NBR	EBLn1	SBL	SBT						
Capacity (veh/h)		-	-	566	1043	-						
HCM Lane V/C Ratio		-	-	1.172	0.074	-						
HCM Control Delay (s)		-	-	119.6	8.7	-						
HCM Lane LOS		-	-	F	A	-						
HCM 95th %tile Q(veh)		-	-	23	0.2	-						

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	9.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	4	29	3	2	35	15	692	22	49	897	29
Future Vol, veh/h	38	4	29	3	2	35	15	692	22	49	897	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	40	4	31	3	2	37	16	728	23	52	944	31
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1855	1847	960	1853	1851	740	975	0	0	751	0	0
Stage 1	1064	1064	-	772	772	-	-	-	-	-	-	-
Stage 2	791	783	-	1081	1079	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	57	75	311	56	73	412	696	-	-	845	-	-
Stage 1	270	300	-	388	405	-	-	-	-	-	-	-
Stage 2	383	404	-	260	291	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	44	62	311	42	61	412	696	-	-	845	-	-
Mov Cap-2 Maneuver	44	62	-	42	61	-	-	-	-	-	-	-
Stage 1	259	260	-	372	389	-	-	-	-	-	-	-
Stage 2	333	388	-	200	252	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	229.6		26.3			0.2			0.5			
HCM LOS	F		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	696	-	-	70	211	845	-	-				
HCM Lane V/C Ratio	0.023	-	-	1.068	0.2	0.061	-	-				
HCM Control Delay (s)	10.3	0	-	229.6	26.3	9.5	0	-				
HCM Lane LOS	B	A	-	F	D	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	5.6	0.7	0.2	-	-				

HCM 6th Signalized Intersection Summary 14: N Forbes Rd/Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	369	55	59	277	323	44	279	17	372	408	149
Future Volume (veh/h)	127	369	55	59	277	323	44	279	17	372	408	149
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	134	388	58	62	292	340	46	294	18	392	429	157
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	190	727	109	342	256	298	233	398	24	295	705	597
Arrive On Green	0.07	0.47	0.47	0.33	0.33	0.33	0.23	0.23	0.23	0.08	0.39	0.39
Sat Flow, veh/h	1739	1552	232	921	769	896	810	1703	104	1739	1826	1547
Grp Volume(v), veh/h	134	0	446	62	0	632	46	0	312	392	429	157
Grp Sat Flow(s),veh/h/ln	1739	0	1784	921	0	1665	810	0	1807	1739	1826	1547
Q Serve(g_s), s	4.8	0.0	17.4	5.0	0.0	32.7	4.8	0.0	15.7	8.2	18.6	6.8
Cycle Q Clear(g_c), s	4.8	0.0	17.4	9.0	0.0	32.7	8.3	0.0	15.7	8.2	18.6	6.8
Prop In Lane	1.00		0.13	1.00		0.54	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	190	0	836	342	0	553	233	0	422	295	705	597
V/C Ratio(X)	0.70	0.00	0.53	0.18	0.00	1.14	0.20	0.00	0.74	1.33	0.61	0.26
Avail Cap(c_a), veh/h	218	0	865	342	0	553	233	0	422	295	705	597
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.1	0.0	18.5	26.5	0.0	32.9	33.6	0.0	34.9	34.0	24.2	20.6
Incr Delay (d2), s/veh	8.4	0.0	0.7	0.3	0.0	84.2	1.9	0.0	11.0	169.8	3.9	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	0.0	10.9	1.9	0.0	36.2	1.8	0.0	12.4	26.3	13.2	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.4	0.0	19.2	26.8	0.0	117.0	35.5	0.0	46.0	203.7	28.1	21.7
LnGrp LOS	C	A	B	C	A	F	D	A	D	F	C	C
Approach Vol, veh/h	580			694			358			978		
Approach Delay, s/veh	22.3			109.0			44.6			97.5		
Approach LOS	C			F			D			F		
Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	13.4	40.0	15.0	30.0		53.4		45.0				
Change Period (Y+Rc), s	6.8	7.3	6.8	7.0		7.3		7.0				
Max Green Setting (Gmax), s	8.2	32.7	8.2	23.0		47.7		38.0				
Max Q Clear Time (g_c+I1), s	6.8	34.7	10.2	17.7		19.4		20.6				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.9		3.3		2.9				
Intersection Summary												
HCM 6th Ctrl Delay	76.6											
HCM 6th LOS	E											

APPENDIX D No-Build Alternative Operational Analysis

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd

Intersection												
Int Delay, s/veh	4.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	2	33	55	3	7	132	263	44	15	470	5
Future Vol, veh/h	5	2	33	55	3	7	132	263	44	15	470	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	2	35	58	3	7	139	277	46	16	495	5
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1113	1131	498	1126	1110	300	500	0	0	323	0	0
Stage 1	530	530	-	578	578	-	-	-	-	-	-	-
Stage 2	583	601	-	548	532	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	183	201	566	180	207	733	1049	-	-	1220	-	-
Stage 1	527	522	-	496	496	-	-	-	-	-	-	-
Stage 2	493	485	-	515	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	154	165	566	145	170	733	1049	-	-	1220	-	-
Mov Cap-2 Maneuver	154	165	-	145	170	-	-	-	-	-	-	-
Stage 1	441	513	-	415	415	-	-	-	-	-	-	-
Stage 2	405	406	-	473	512	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	15.4		43.3		2.7		0.2					
HCM LOS	C		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1049	-	-	389	160	1220	-	-				
HCM Lane V/C Ratio	0.132	-	-	0.108	0.428	0.013	-	-				
HCM Control Delay (s)	9	0	-	15.4	43.3	8	0	-				
HCM Lane LOS	A	A	-	C	E	A	A	-				
HCM 95th %tile Q(veh)	0.5	-	-	0.4	1.9	0	-	-				

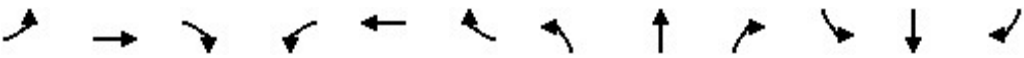
HCM 6th Signalized Intersection Summary

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	160	8	232	656	207	0	0	335	223
Future Volume (veh/h)	0	0	0	160	8	232	656	207	0	0	335	223
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1826	1826	1826	1826	1826	0	0	1826	1826
Adj Flow Rate, veh/h				168	8	0	691	218	0	0	353	0
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				307	15		801	1320	0	0	704	
Arrive On Green				0.18	0.18	0.00	0.49	1.00	0.00	0.00	0.39	0.00
Sat Flow, veh/h				1664	79	1547	1739	1826	0	0	1826	0
Grp Volume(v), veh/h				176	0	0	691	218	0	0	353	0
Grp Sat Flow(s),veh/h/ln				1743	0	1547	1739	1826	0	0	1826	0
Q Serve(g_s), s				11.9	0.0	0.0	34.2	0.0	0.0	0.0	19.1	0.0
Cycle Q Clear(g_c), s				11.9	0.0	0.0	34.2	0.0	0.0	0.0	19.1	0.0
Prop In Lane				0.95		1.00	1.00		0.00	0.00		0.00
Lane Grp Cap(c), veh/h				322	0		801	1320	0	0	704	
V/C Ratio(X)				0.55	0.00		0.86	0.17	0.00	0.00	0.50	
Avail Cap(c_a), veh/h				322	0		883	1320	0	0	704	
HCM Platoon Ratio				1.00	1.00	1.00	1.67	1.67	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.09	0.09	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				48.1	0.0	0.0	10.8	0.0	0.0	0.0	30.4	0.0
Incr Delay (d2), s/veh				6.5	0.0	0.0	0.8	0.0	0.0	0.0	2.5	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				9.7	0.0	0.0	7.2	0.0	0.0	0.0	13.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				54.6	0.0	0.0	11.6	0.0	0.0	0.0	33.0	0.0
LnGrp LOS				D	A		B	A	A	A	C	
Approach Vol, veh/h					176			909			353	
Approach Delay, s/veh					54.6			8.8			33.0	
Approach LOS					D			A			C	
Timer - Assigned Phs	2			5		6	8					
Phs Duration (G+Y+Rc), s	100.0			43.9		56.1	30.0					
Change Period (Y+Rc), s	6.0			6.0		6.0	6.0					
Max Green Setting (Gmax), s	94.0			44.0		44.0	24.0					
Max Q Clear Time (g_c+I1), s	2.0			36.2		21.1	13.9					
Green Ext Time (p_c), s	1.3			1.7		1.9	0.6					
Intersection Summary												
HCM 6th Ctrl Delay			20.3									
HCM 6th LOS			C									
Notes												

HCM 6th Signalized Intersection Summary

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱					↰		↱	↰	↱
Traffic Volume (veh/h)	74	6	490	0	0	0	0	789	338	94	401	0
Future Volume (veh/h)	74	6	490	0	0	0	0	789	338	94	401	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826				0	1826	1826	1826	1826	0
Adj Flow Rate, veh/h	78	6	0				0	831	0	99	422	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	262	20					0	1183		374	1362	0
Arrive On Green	0.16	0.16	0.00				0.00	0.65	0.00	0.05	0.75	0.00
Sat Flow, veh/h	1620	125	1547				0	1826	0	1739	1826	0
Grp Volume(v), veh/h	84	0	0				0	831	0	99	422	0
Grp Sat Flow(s),veh/h/ln	1745	0	1547				0	1826	0	1739	1826	0
Q Serve(g_s), s	5.5	0.0	0.0				0.0	38.3	0.0	2.2	9.9	0.0
Cycle Q Clear(g_c), s	5.5	0.0	0.0				0.0	38.3	0.0	2.2	9.9	0.0
Prop In Lane	0.93		1.00				0.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	282	0					0	1183		374	1362	0
V/C Ratio(X)	0.30	0.00					0.00	0.70		0.26	0.31	0.00
Avail Cap(c_a), veh/h	282	0					0	1183		377	1362	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	0.00	0.13	0.13	0.00
Uniform Delay (d), s/veh	48.0	0.0	0.0				0.0	14.8	0.0	12.9	5.4	0.0
Incr Delay (d2), s/veh	2.7	0.0	0.0				0.0	3.5	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.7	0.0	0.0				0.0	22.4	0.0	1.5	4.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.7	0.0	0.0				0.0	18.3	0.0	13.0	5.5	0.0
LnGrp LOS	D	A					A	B		B	A	A
Approach Vol, veh/h		84						831			521	
Approach Delay, s/veh		50.7						18.3			6.9	
Approach LOS		D						B			A	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	12.8	90.2		27.0		103.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	7.0	84.0		21.0		97.0						
Max Q Clear Time (g_c+I1), s	4.2	40.3		7.5		11.9						
Green Ext Time (p_c), s	0.0	7.4		0.3		2.8						
Intersection Summary												
HCM 6th Ctrl Delay			16.1									
HCM 6th LOS			B									
Notes												
Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection

Int Delay, s/veh 40.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔		↔	↔	
Traffic Vol, veh/h	44	16	40	4	6	50	10	1033	10	35	829	27
Future Vol, veh/h	44	16	40	4	6	50	10	1033	10	35	829	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	46	17	42	4	6	53	11	1087	11	37	873	28

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	2105	2081	887	2106	2090	1093	901	0	0	1098	0	0
Stage 1	961	961	-	1115	1115	-	-	-	-	-	-	-
Stage 2	1144	1120	-	991	975	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 38	53	343	37	52	257	742	-	-	625	-	-
Stage 1	308	335	-	249	280	-	-	-	-	-	-	-
Stage 2	243	282	-	293	326	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 25	48	343	22	47	257	742	-	-	625	-	-
Mov Cap-2 Maneuver	~ 25	48	-	22	47	-	-	-	-	-	-	-
Stage 1	296	315	-	240	269	-	-	-	-	-	-	-
Stage 2	182	271	-	229	307	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s\$	804.6	65.2	0.1	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	742	-	-	45	119	625	-
HCM Lane V/C Ratio	0.014	-	-	2.339	0.531	0.059	-
HCM Control Delay (s)	9.9	0	-	\$ 804.6	65.2	11.1	-
HCM Lane LOS	A	A	-	F	F	B	-
HCM 95th %tile Q(veh)	0	-	-	11.1	2.5	0.2	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	300	20	28	461	451	48	422	10	314	341	218
Future Volume (veh/h)	180	300	20	28	461	451	48	422	10	314	341	218
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	189	316	21	29	485	475	51	444	11	331	359	229
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	215	808	54	405	277	271	256	408	10	215	694	588
Arrive On Green	0.08	0.48	0.48	0.33	0.33	0.33	0.23	0.23	0.23	0.08	0.38	0.38
Sat Flow, veh/h	1739	1693	113	1019	847	830	808	1774	44	1739	1826	1547
Grp Volume(v), veh/h	189	0	337	29	0	960	51	0	455	331	359	229
Grp Sat Flow(s),veh/h/ln	1739	0	1806	1019	0	1677	808	0	1818	1739	1826	1547
Q Serve(g_s), s	7.0	0.0	12.0	2.0	0.0	32.7	5.2	0.0	23.0	8.2	15.2	10.8
Cycle Q Clear(g_c), s	7.0	0.0	12.0	2.0	0.0	32.7	5.4	0.0	23.0	8.2	15.2	10.8
Prop In Lane	1.00		0.06	1.00		0.49	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	215	0	861	405	0	548	256	0	418	215	694	588
V/C Ratio(X)	0.88	0.00	0.39	0.07	0.00	1.75	0.20	0.00	1.09	1.54	0.52	0.39
Avail Cap(c_a), veh/h	215	0	861	405	0	548	256	0	418	215	694	588
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	0.0	16.8	23.3	0.0	33.7	31.8	0.0	38.5	30.7	23.9	22.6
Incr Delay (d2), s/veh	31.7	0.0	0.3	0.1	0.0	345.5	1.7	0.0	69.8	266.0	2.7	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.0	0.0	8.2	0.8	0.0	101.7	2.0	0.0	26.2	30.7	11.1	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.0	0.0	17.2	23.4	0.0	379.1	33.5	0.0	108.3	296.7	26.7	24.5
LnGrp LOS	E	A	B	C	A	F	C	A	F	F	C	C
Approach Vol, veh/h	526			989			506			919		
Approach Delay, s/veh	31.1			368.7			100.8			123.4		
Approach LOS	C			F			F			F		
Timer - Assigned Phs	1	2	3	4	6		8					
Phs Duration (G+Y+Rc), s	15.0	40.0	15.0	30.0	55.0		45.0					
Change Period (Y+Rc), s	6.8	7.3	6.8	7.0	7.3		7.0					
Max Green Setting (Gmax), s	8.2	32.7	8.2	23.0	47.7		38.0					
Max Q Clear Time (g_c+I1), s	9.0	34.7	10.2	25.0	14.0		17.2					
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	2.4		2.8					
Intersection Summary												
HCM 6th Ctrl Delay	185.5											
HCM 6th LOS	F											

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd

Intersection												
Int Delay, s/veh	3.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	41	31	2	12	116	342	24	7	314	10
Future Vol, veh/h	20	0	41	31	2	12	116	342	24	7	314	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	21	0	43	33	2	13	122	360	25	7	331	11
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	975	980	337	989	973	373	342	0	0	385	0	0
Stage 1	351	351	-	617	617	-	-	-	-	-	-	-
Stage 2	624	629	-	372	356	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	228	247	698	223	249	666	1200	-	-	1157	-	-
Stage 1	659	627	-	472	477	-	-	-	-	-	-	-
Stage 2	468	471	-	642	624	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	199	213	698	187	215	666	1200	-	-	1157	-	-
Mov Cap-2 Maneuver	199	213	-	187	215	-	-	-	-	-	-	-
Stage 1	573	623	-	411	415	-	-	-	-	-	-	-
Stage 2	397	410	-	598	620	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	16.3		24.4			2			0.2			
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1200	-	-	383	233	1157	-	-				
HCM Lane V/C Ratio	0.102	-	-	0.168	0.203	0.006	-	-				
HCM Control Delay (s)	8.3	0	-	16.3	24.4	8.1	0	-				
HCM Lane LOS	A	A	-	C	C	A	A	-				
HCM 95th %tile Q(veh)	0.3	-	-	0.6	0.7	0	-	-				

HCM 6th Signalized Intersection Summary

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	291	3	217	382	265	0	0	293	93
Future Volume (veh/h)	0	0	0	291	3	217	382	265	0	0	293	93
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1826	1826	1826	1826	1826	0	0	1826	1826
Adj Flow Rate, veh/h				306	3	0	402	279	0	0	308	0
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				490	5		631	1138	0	0	758	
Arrive On Green				0.28	0.28	0.00	0.21	0.83	0.00	0.00	0.42	0.00
Sat Flow, veh/h				1723	17	1547	1739	1826	0	0	1826	0
Grp Volume(v), veh/h				309	0	0	402	279	0	0	308	0
Grp Sat Flow(s),veh/h/ln				1740	0	1547	1739	1826	0	0	1826	0
Q Serve(g_s), s				20.1	0.0	0.0	0.0	4.3	0.0	0.0	15.4	0.0
Cycle Q Clear(g_c), s				20.1	0.0	0.0	0.0	4.3	0.0	0.0	15.4	0.0
Prop In Lane				0.99		1.00	1.00		0.00	0.00		0.00
Lane Grp Cap(c), veh/h				495	0		631	1138	0	0	758	
V/C Ratio(X)				0.62	0.00		0.64	0.25	0.00	0.00	0.41	
Avail Cap(c_a), veh/h				495	0		631	1138	0	0	758	
HCM Platoon Ratio				1.00	1.00	1.00	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.13	0.13	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				40.4	0.0	0.0	29.4	4.6	0.0	0.0	26.7	0.0
Incr Delay (d2), s/veh				5.8	0.0	0.0	0.3	0.1	0.0	0.0	1.6	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				14.3	0.0	0.0	11.9	2.2	0.0	0.0	11.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				46.3	0.0	0.0	29.7	4.6	0.0	0.0	28.3	0.0
LnGrp LOS				D	A		C	A	A	A	C	
Approach Vol, veh/h					309			681			308	
Approach Delay, s/veh					46.3			19.4			28.3	
Approach LOS					D			B			C	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	87.0			27.0			60.0			43.0		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	81.0			21.0			54.0			37.0		
Max Q Clear Time (g_c+l1), s	6.3			2.0			17.4			22.1		
Green Ext Time (p_c), s	1.7			1.2			1.7			1.5		
Intersection Summary												
HCM 6th Ctrl Delay			27.9									
HCM 6th LOS			C									
Notes												

HCM 6th Signalized Intersection Summary 8: Branch Forbes Rd & I-4 EB Off-ramp/I-4 EB On-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	4	608	0	0	0	0	539	316	82	502	0
Future Volume (veh/h)	108	4	608	0	0	0	0	539	316	82	502	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826				0	1826	1826	1826	1826	0
Adj Flow Rate, veh/h	114	4	0				0	567	0	86	528	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	479	17					0	959		402	1138	0
Arrive On Green	0.28	0.28	0.00				0.00	0.53	0.00	0.10	1.00	0.00
Sat Flow, veh/h	1683	59	1547				0	1826	0	1739	1826	0
Grp Volume(v), veh/h	118	0	0				0	567	0	86	528	0
Grp Sat Flow(s),veh/h/ln	1742	0	1547				0	1826	0	1739	1826	0
Q Serve(g_s), s	6.8	0.0	0.0				0.0	27.8	0.0	2.8	0.0	0.0
Cycle Q Clear(g_c), s	6.8	0.0	0.0				0.0	27.8	0.0	2.8	0.0	0.0
Prop In Lane	0.97		1.00				0.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	496	0					0	959		402	1138	0
V/C Ratio(X)	0.24	0.00					0.00	0.59		0.21	0.46	0.00
Avail Cap(c_a), veh/h	496	0					0	959		406	1138	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	0.00	0.81	0.81	0.00
Uniform Delay (d), s/veh	35.7	0.0	0.0				0.0	21.2	0.0	14.3	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0				0.0	2.7	0.0	0.2	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.5	0.0	0.0				0.0	18.0	0.0	1.8	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.8	0.0	0.0				0.0	23.9	0.0	14.5	1.1	0.0
LnGrp LOS	D	A					A	C		B	A	A
Approach Vol, veh/h	118						567			614		
Approach Delay, s/veh	36.8						23.9			3.0		
Approach LOS	D						C			A		
Timer - Assigned Phs	1	2	4				6					
Phs Duration (G+Y+Rc), s	12.7	74.3	43.0				87.0					
Change Period (Y+Rc), s	6.0	6.0	6.0				6.0					
Max Green Setting (Gmax), s	7.0	68.0	37.0				81.0					
Max Q Clear Time (g_c+I1), s	4.8	29.8	8.8				2.0					
Green Ext Time (p_c), s	0.0	4.1	0.6				3.8					
Intersection Summary												
HCM 6th Ctrl Delay	15.2											
HCM 6th LOS	B											

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	18.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	4	29	4	3	44	17	773	25	56	1021	33
Future Vol, veh/h	38	4	29	4	3	44	17	773	25	56	1021	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	40	4	31	4	3	46	18	814	26	59	1075	35
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	2099	2087	1093	2091	2091	827	1110	0	0	840	0	0
Stage 1	1211	1211	-	863	863	-	-	-	-	-	-	-
Stage 2	888	876	-	1228	1228	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 38	53	261	38	51	367	618	-	-	782	-	-
Stage 1	223	255	-	345	367	-	-	-	-	-	-	-
Stage 2	338	367	-	215	247	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 28	46	261	28	45	367	618	-	-	782	-	-
Mov Cap-2 Maneuver	~ 28	46	-	28	45	-	-	-	-	-	-	-
Stage 1	211	236	-	326	347	-	-	-	-	-	-	-
Stage 2	277	347	-	172	228	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s\$	501.3		40.1			0.2			0.5			
HCM LOS	F		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	618	-	-	46	155	782	-	-				
HCM Lane V/C Ratio	0.029	-	-	1.625	0.346	0.075	-	-				
HCM Control Delay (s)	11	0	-	\$ 501.3	40.1	10	-	-				
HCM Lane LOS	B	A	-	F	E	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	7.4	1.4	0.2	-	-				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			

HCM 6th Signalized Intersection Summary 14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	422	63	66	307	358	49	312	19	421	464	169
Future Volume (veh/h)	145	422	63	66	307	358	49	312	19	421	464	169
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	153	444	66	69	323	377	52	328	20	443	488	178
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	203	735	109	300	253	295	191	395	24	265	699	593
Arrive On Green	0.07	0.47	0.47	0.33	0.33	0.33	0.23	0.23	0.23	0.08	0.38	0.38
Sat Flow, veh/h	1739	1553	231	869	768	896	752	1703	104	1739	1826	1547
Grp Volume(v), veh/h	153	0	510	69	0	700	52	0	348	443	488	178
Grp Sat Flow(s),veh/h/ln	1739	0	1784	869	0	1665	752	0	1807	1739	1826	1547
Q Serve(g_s), s	5.5	0.0	20.9	6.3	0.0	32.7	6.2	0.0	18.2	8.2	22.3	8.0
Cycle Q Clear(g_c), s	5.5	0.0	20.9	13.0	0.0	32.7	13.5	0.0	18.2	8.2	22.3	8.0
Prop In Lane	1.00		0.13	1.00		0.54	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	203	0	844	300	0	549	191	0	419	265	699	593
V/C Ratio(X)	0.75	0.00	0.60	0.23	0.00	1.28	0.27	0.00	0.83	1.67	0.70	0.30
Avail Cap(c_a), veh/h	216	0	858	300	0	549	191	0	419	265	699	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.1	0.0	19.3	29.4	0.0	33.3	37.8	0.0	36.3	33.4	25.8	21.3
Incr Delay (d2), s/veh	13.2	0.0	1.3	0.5	0.0	137.9	3.5	0.0	17.2	317.5	5.7	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.0	0.0	12.8	2.3	0.0	49.3	2.3	0.0	14.7	40.0	15.6	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.3	0.0	20.6	29.8	0.0	171.1	41.3	0.0	53.5	350.9	31.5	22.6
LnGrp LOS	D	A	C	C	A	F	D	A	D	F	C	C
Approach Vol, veh/h	663			769			400			1109		
Approach Delay, s/veh	24.5			158.5			51.9			157.7		
Approach LOS	C			F			D			F		
Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	14.2	40.0	15.0	30.0		54.2		45.0				
Change Period (Y+Rc), s	6.8	7.3	6.8	7.0		7.3		7.0				
Max Green Setting (Gmax), s	8.2	32.7	8.2	23.0		47.7		38.0				
Max Q Clear Time (g_c+l1), s	7.5	34.7	10.2	20.2		22.9		24.3				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.6		3.8		3.1				
Intersection Summary												
HCM 6th Ctrl Delay	113.5											
HCM 6th LOS	F											

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd

11/16/2022

Intersection												
Int Delay, s/veh	44.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	4	57	64	3	8	217	435	72	24	758	8
Future Vol, veh/h	9	4	57	64	3	8	217	435	72	24	758	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	9	4	60	67	3	8	228	458	76	25	798	8
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1810	1842	802	1836	1808	496	806	0	0	534	0	0
Stage 1	852	852	-	952	952	-	-	-	-	-	-	-
Stage 2	958	990	-	884	856	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	60	74	379	~ 57	78	568	806	-	-	1019	-	-
Stage 1	350	372	-	308	334	-	-	-	-	-	-	-
Stage 2	305	321	-	336	370	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	37	42	379	~ 29	44	568	806	-	-	1019	-	-
Mov Cap-2 Maneuver	37	42	-	~ 29	44	-	-	-	-	-	-	-
Stage 1	208	355	-	183	198	-	-	-	-	-	-	-
Stage 2	175	190	-	267	353	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	54.3		\$ 891.7		3.4		0.3					
HCM LOS	F		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	806	-	-	143	33	1019	-	-				
HCM Lane V/C Ratio	0.283	-	-	0.515	2.392	0.025	-	-				
HCM Control Delay (s)	11.2	0	-	54.3	\$ 891.7	8.6	0	-				
HCM Lane LOS	B	A	-	F	F	A	A	-				
HCM 95th %tile Q(veh)	1.2	-	-	2.5	9	0.1	-	-				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

HCM 6th Signalized Intersection Summary

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

11/16/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	264	13	383	1083	342	0	0	527	352
Future Volume (veh/h)	0	0	0	264	13	383	1083	342	0	0	527	352
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1826	1826	1826	1826	1826	0	0	1826	1826
Adj Flow Rate, veh/h				278	14	0	1140	360	0	0	555	0
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				259	13		756	1404	0	0	662	
Arrive On Green				0.16	0.16	0.00	0.62	1.00	0.00	0.00	0.36	0.00
Sat Flow, veh/h				1659	84	1547	1739	1826	0	0	1826	0
Grp Volume(v), veh/h				292	0	0	1140	360	0	0	555	0
Grp Sat Flow(s),veh/h/ln				1743	0	1547	1739	1826	0	0	1826	0
Q Serve(g_s), s				25.0	0.0	0.0	59.0	0.0	0.0	0.0	44.5	0.0
Cycle Q Clear(g_c), s				25.0	0.0	0.0	59.0	0.0	0.0	0.0	44.5	0.0
Prop In Lane				0.95		1.00	1.00		0.00	0.00		0.00
Lane Grp Cap(c), veh/h				272	0		756	1404	0	0	662	
V/C Ratio(X)				1.07	0.00		1.51	0.26	0.00	0.00	0.84	
Avail Cap(c_a), veh/h				272	0		756	1404	0	0	662	
HCM Platoon Ratio				1.00	1.00	1.00	1.67	1.67	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	0.09	0.09	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				67.5	0.0	0.0	19.4	0.0	0.0	0.0	46.7	0.0
Incr Delay (d2), s/veh				75.0	0.0	0.0	228.9	0.0	0.0	0.0	12.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				24.3	0.0	0.0	75.6	0.0	0.0	0.0	29.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				142.5	0.0	0.0	248.3	0.0	0.0	0.0	58.8	0.0
LnGrp LOS				F	A		F	A	A	A	E	
Approach Vol, veh/h					292			1500			555	
Approach Delay, s/veh					142.5			188.7			58.8	
Approach LOS					F			F			E	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	129.0			65.0			64.0			31.0		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	123.0			59.0			58.0			25.0		
Max Q Clear Time (g_c+I1), s	2.0			61.0			46.5			27.0		
Green Ext Time (p_c), s	2.3			0.0			2.5			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	152.3											
HCM 6th LOS	F											

HCM 6th Signalized Intersection Summary

8: Branch Forbes Rd & I-4 EB Off-ramp/I-4 EB On-ramp

11/16/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	9	800	0	0	0	0	1304	559	150	641	0
Future Volume (veh/h)	121	9	800	0	0	0	0	1304	559	150	641	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826				0	1826	1826	1826	1826	0
Adj Flow Rate, veh/h	127	9	0				0	1373	0	158	675	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	255	18					0	1255		121	1404	0
Arrive On Green	0.16	0.16	0.00				0.00	0.91	0.00	0.03	0.52	0.00
Sat Flow, veh/h	1629	115	1547				0	1826	0	1739	1826	0
Grp Volume(v), veh/h	136	0	0				0	1373	0	158	675	0
Grp Sat Flow(s),veh/h/ln	1744	0	1547				0	1826	0	1739	1826	0
Q Serve(g_s), s	11.4	0.0	0.0				0.0	110.0	0.0	7.0	38.1	0.0
Cycle Q Clear(g_c), s	11.4	0.0	0.0				0.0	110.0	0.0	7.0	38.1	0.0
Prop In Lane	0.93		1.00				0.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	273	0					0	1255		121	1404	0
V/C Ratio(X)	0.50	0.00					0.00	1.09		1.30	0.48	0.00
Avail Cap(c_a), veh/h	273	0					0	1255		121	1404	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.33	1.33	0.67	0.67	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	0.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	61.8	0.0	0.0				0.0	6.8	0.0	61.1	18.2	0.0
Incr Delay (d2), s/veh	6.4	0.0	0.0				0.0	55.0	0.0	142.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.4	0.0	0.0				0.0	34.2	0.0	10.6	19.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.2	0.0	0.0				0.0	61.9	0.0	203.8	18.3	0.0
LnGrp LOS	E	A					A	F		F	B	A
Approach Vol, veh/h		136						1373			833	
Approach Delay, s/veh		68.2						61.9			53.5	
Approach LOS		E						E			D	
Timer - Assigned Phs	1	2		4			6					
Phs Duration (G+Y+Rc), s	13.0	116.0		31.0			129.0					
Change Period (Y+Rc), s	6.0	6.0		6.0			6.0					
Max Green Setting (Gmax), s	7.0	110.0		25.0			123.0					
Max Q Clear Time (g_c+I1), s	9.0	112.0		13.4			40.1					
Green Ext Time (p_c), s	0.0	0.0		0.5			5.4					
Intersection Summary												
HCM 6th Ctrl Delay			59.3									
HCM 6th LOS			E									
Notes												
Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.												

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	26	64	6	10	84	17	1709	17	58	1340	43
Future Vol, veh/h	70	26	64	6	10	84	17	1709	17	58	1340	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	74	27	67	6	11	88	18	1799	18	61	1411	45

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	3450	3409	1434	3447	3422	1808	1456	0	0	1817	0	0
Stage 1	1556	1556	-	1844	1844	-	-	-	-	-	-	-
Stage 2	1894	1853	-	1603	1578	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 4	~ 7	164	~ 4	~ 7	96	456	-	-	330	-	-
Stage 1	141	174	-	94	123	-	-	-	-	-	-	-
Stage 2	90	124	-	131	167	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 6	164	-	~ 6	96	456	-	-	330	-	-
Mov Cap-2 Maneuver	-	~ 6	-	-	~ 6	-	-	-	-	-	-	-
Stage 1	141	142	-	94	123	-	-	-	-	-	-	-
Stage 2	~ 6	124	-	51	136	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.1	0.7
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	456	-	-	-	330	-	-
HCM Lane V/C Ratio	0.039	-	-	-	0.185	-	-
HCM Control Delay (s)	13.2	0	-	-	18.4	-	-
HCM Lane LOS	B	A	-	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary

14: Branch Forbes Rd & US 92

11/16/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	292	486	32	46	755	739	81	712	16	508	550	352
Future Volume (veh/h)	292	486	32	46	755	739	81	712	16	508	550	352
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	307	512	34	48	795	778	85	749	17	535	579	371
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	243	1273	84	238	796	579	65	600	14	489	810	863
Arrive On Green	0.11	0.39	0.39	0.23	0.23	0.23	0.04	0.34	0.34	0.24	0.74	0.74
Sat Flow, veh/h	1739	3302	219	840	3469	1547	1739	1778	40	3374	1826	1547
Grp Volume(v), veh/h	307	268	278	48	795	778	85	0	766	535	579	371
Grp Sat Flow(s),veh/h/ln	1739	1735	1787	840	1735	1547	1739	0	1819	1687	1826	1547
Q Serve(g_s), s	18.2	18.0	18.1	7.5	36.7	36.7	6.0	0.0	54.0	23.2	27.9	8.2
Cycle Q Clear(g_c), s	18.2	18.0	18.1	7.5	36.7	36.7	6.0	0.0	54.0	23.2	27.9	8.2
Prop In Lane	1.00		0.12	1.00		1.00	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	243	669	689	238	796	579	65	0	614	489	810	863
V/C Ratio(X)	1.26	0.40	0.40	0.20	1.00	1.34	1.30	0.00	1.25	1.09	0.71	0.43
Avail Cap(c_a), veh/h	243	669	689	238	796	579	65	0	614	489	810	863
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.1	35.7	35.8	50.4	61.6	50.1	77.0	0.0	53.0	60.6	15.1	3.6
Incr Delay (d2), s/veh	147.4	1.8	1.8	1.9	31.7	165.7	212.7	0.0	124.8	68.6	5.3	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	26.1	12.5	12.8	3.0	26.5	71.3	11.4	0.0	64.6	20.8	13.9	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	197.4	37.5	37.5	52.3	93.3	215.7	289.7	0.0	177.8	129.2	20.5	5.2
LnGrp LOS	F	D	D	D	F	F	F	A	F	F	C	A
Approach Vol, veh/h	853			1621			851			1485		
Approach Delay, s/veh	95.1			150.9			189.0			55.8		
Approach LOS	F			F			F			E		
Timer - Assigned Phs	1	2	3	4	6		7	8				
Phs Duration (G+Y+Rc), s	25.0	44.0	30.0	61.0	69.0		13.0	78.0				
Change Period (Y+Rc), s	6.8	7.3	6.8	7.0	7.3		7.0	7.0				
Max Green Setting (Gmax), s	18.2	36.7	23.2	54.0	61.7		6.0	71.0				
Max Q Clear Time (g_c+l1), s	20.2	38.7	25.2	56.0	20.1		8.0	29.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	4.0		0.0	5.8				
Intersection Summary												
HCM 6th Ctrl Delay	118.4											
HCM 6th LOS	F											

Arterial Level of Service

11/16/2022

Arterial Level of Service: NB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 92	II	45	21.2	172.1	193.3	0.19	3.6	F
I-4 EB On-ramp	II	35	38.9	308.3	347.2	0.36	3.7	F
I-4 WB off-ramp	II	35	14.5	7.9	22.4	0.12	18.6	D
Total	II		74.6	488.3	562.9	0.67	4.3	F

Arterial Level of Service: SB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-4 WB on-ramp	II	45	30.3	250.9	281.2	0.31	3.9	F
I-4 EB Off-ramp	II	35	14.5	1.3	15.8	0.12	26.4	C
US 92	II	35	38.9	33.3	72.2	0.36	18.0	D
Total	II		83.7	285.5	369.2	0.78	7.6	F

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd

11/16/2022

Intersection												
Int Delay, s/veh	44.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	4	57	64	3	8	217	435	72	24	758	8
Future Vol, veh/h	9	4	57	64	3	8	217	435	72	24	758	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	9	4	60	67	3	8	228	458	76	25	798	8
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1810	1842	802	1836	1808	496	806	0	0	534	0	0
Stage 1	852	852	-	952	952	-	-	-	-	-	-	-
Stage 2	958	990	-	884	856	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	60	74	379	~ 57	78	568	806	-	-	1019	-	-
Stage 1	350	372	-	308	334	-	-	-	-	-	-	-
Stage 2	305	321	-	336	370	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	37	42	379	~ 29	44	568	806	-	-	1019	-	-
Mov Cap-2 Maneuver	37	42	-	~ 29	44	-	-	-	-	-	-	-
Stage 1	208	355	-	183	198	-	-	-	-	-	-	-
Stage 2	175	190	-	267	353	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	54.3		\$ 891.7		3.4		0.3					
HCM LOS	F		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	806	-	-	143	33	1019	-	-				
HCM Lane V/C Ratio	0.283	-	-	0.515	2.392	0.025	-	-				
HCM Control Delay (s)	11.2	0	-	54.3	\$ 891.7	8.6	0	-				
HCM Lane LOS	B	A	-	F	F	A	A	-				
HCM 95th %tile Q(veh)	1.2	-	-	2.5	9	0.1	-	-				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon						

HCM 6th Signalized Intersection Summary

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	473	4	353	634	440	0	0	473	149
Future Volume (veh/h)	0	0	0	473	4	353	634	440	0	0	473	149
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1826	1826	1826	1826	1826	0	0	1826	1826
Adj Flow Rate, veh/h				498	4	0	667	463	0	0	498	0
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				5	5	5	5	5	0	0	5	5
Cap, veh/h				518	4		525	1141	0	0	730	
Arrive On Green				0.30	0.30	0.00	0.31	1.00	0.00	0.00	0.40	0.00
Sat Flow, veh/h				1726	14	1547	1739	1826	0	0	1826	0
Grp Volume(v), veh/h				502	0	0	667	463	0	0	498	0
Grp Sat Flow(s),veh/h/ln				1740	0	1547	1739	1826	0	0	1826	0
Q Serve(g_s), s				45.4	0.0	0.0	30.0	0.0	0.0	0.0	36.0	0.0
Cycle Q Clear(g_c), s				45.4	0.0	0.0	30.0	0.0	0.0	0.0	36.0	0.0
Prop In Lane				0.99		1.00	1.00		0.00	0.00		0.00
Lane Grp Cap(c), veh/h				522	0		525	1141	0	0	730	
V/C Ratio(X)				0.96	0.00		1.27	0.41	0.00	0.00	0.68	
Avail Cap(c_a), veh/h				522	0		525	1141	0	0	730	
HCM Platoon Ratio				1.00	1.00	1.00	1.67	1.67	1.00	1.00	1.00	1.00
Upstream Filter(l)				1.00	0.00	0.00	0.09	0.09	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				55.1	0.0	0.0	25.7	0.0	0.0	0.0	39.6	0.0
Incr Delay (d2), s/veh				31.0	0.0	0.0	123.4	0.1	0.0	0.0	5.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				32.3	0.0	0.0	35.6	0.1	0.0	0.0	23.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				86.1	0.0	0.0	149.1	0.1	0.0	0.0	44.7	0.0
LnGrp LOS				F	A		F	A	A	A	D	
Approach Vol, veh/h					502			1130			498	
Approach Delay, s/veh					86.1			88.1			44.7	
Approach LOS					F			F			D	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	106.0			36.0			70.0			54.0		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	88.0			30.0			64.0			48.0		
Max Q Clear Time (g_c+l1), s	2.0			32.0			38.0			47.4		
Green Ext Time (p_c), s	3.2			0.0			2.9			0.2		
Intersection Summary												
HCM 6th Ctrl Delay			77.5									
HCM 6th LOS			E									
Notes												

HCM 6th Signalized Intersection Summary 8: Branch Forbes Rd & I-4 EB Off-ramp/I-4 EB On-Ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	6	1006	0	0	0	0	895	526	133	813	0
Future Volume (veh/h)	179	6	1006	0	0	0	0	895	526	133	813	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826				0	1826	1826	1826	1826	0
Adj Flow Rate, veh/h	188	6	0				0	942	0	140	856	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5				0	5	5	5	5	0
Cap, veh/h	506	16					0	993		147	1141	0
Arrive On Green	0.30	0.30	0.00				0.00	0.54	0.00	0.04	0.63	0.00
Sat Flow, veh/h	1688	54	1547				0	1826	0	1739	1826	0
Grp Volume(v), veh/h	194	0	0				0	942	0	140	856	0
Grp Sat Flow(s),veh/h/ln	1742	0	1547				0	1826	0	1739	1826	0
Q Serve(g_s), s	14.0	0.0	0.0				0.0	77.8	0.0	6.3	53.0	0.0
Cycle Q Clear(g_c), s	14.0	0.0	0.0				0.0	77.8	0.0	6.3	53.0	0.0
Prop In Lane	0.97		1.00				0.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	522	0					0	993		147	1141	0
V/C Ratio(X)	0.37	0.00					0.00	0.95		0.95	0.75	0.00
Avail Cap(c_a), veh/h	522	0					0	993		147	1141	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	0.00	0.26	0.26	0.00
Uniform Delay (d), s/veh	44.1	0.0	0.0				0.0	34.4	0.0	73.9	21.2	0.0
Incr Delay (d2), s/veh	2.0	0.0	0.0				0.0	18.6	0.0	26.1	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.6	0.0	0.0				0.0	48.7	0.0	9.0	26.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.1	0.0	0.0				0.0	53.0	0.0	100.0	22.4	0.0
LnGrp LOS	D	A					A	D		F	C	A
Approach Vol, veh/h		194						942			996	
Approach Delay, s/veh		46.1						53.0			33.3	
Approach LOS		D						D			C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	13.0	93.0		54.0		106.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	7.0	87.0		48.0		100.0						
Max Q Clear Time (g_c+I1), s	8.3	79.8		16.0		55.0						
Green Ext Time (p_c), s	0.0	3.8		1.1		7.8						
Intersection Summary												
HCM 6th Ctrl Delay			43.2									
HCM 6th LOS			D									
Notes												
Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.												

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	26	64	6	10	84	17	1709	17	58	1340	43
Future Vol, veh/h	70	26	64	6	10	84	17	1709	17	58	1340	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	74	27	67	6	11	88	18	1799	18	61	1411	45
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	3450	3409	1434	3447	3422	1808	1456	0	0	1817	0	0
Stage 1	1556	1556	-	1844	1844	-	-	-	-	-	-	-
Stage 2	1894	1853	-	1603	1578	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 4	~ 7	164	~ 4	~ 7	96	456	-	-	330	-	-
Stage 1	141	174	-	94	123	-	-	-	-	-	-	-
Stage 2	90	124	-	131	167	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 6	164	-	~ 6	96	456	-	-	330	-	-
Mov Cap-2 Maneuver	-	~ 6	-	-	~ 6	-	-	-	-	-	-	-
Stage 1	141	142	-	94	123	-	-	-	-	-	-	-
Stage 2	~ 6	124	-	51	136	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s							0.1		0.7			
HCM LOS	-		-									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	456	-	-	-	-	330	-	-				
HCM Lane V/C Ratio	0.039	-	-	-	-	0.185	-	-				
HCM Control Delay (s)	13.2	0	-	-	-	18.4	-	-				
HCM Lane LOS	B	A	-	-	-	C	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.7	-	-				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			

HCM 6th Signalized Intersection Summary

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	239	697	104	109	508	593	82	517	32	693	762	277
Future Volume (veh/h)	239	697	104	109	508	593	82	517	32	693	762	277
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	252	734	109	115	535	624	86	544	34	729	802	292
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	216	1131	168	155	935	417	65	553	35	574	833	706
Arrive On Green	0.06	0.37	0.37	0.27	0.27	0.27	0.04	0.32	0.32	0.17	0.46	0.46
Sat Flow, veh/h	1739	3030	450	637	3469	1547	1739	1700	106	3374	1826	1547
Grp Volume(v), veh/h	252	420	423	115	535	624	86	0	578	729	802	292
Grp Sat Flow(s),veh/h/ln	1739	1735	1745	637	1735	1547	1739	0	1807	1687	1826	1547
Q Serve(g_s), s	9.8	32.1	32.1	27.6	21.3	43.1	6.0	0.0	50.8	27.2	68.1	14.7
Cycle Q Clear(g_c), s	9.8	32.1	32.1	43.1	21.3	43.1	6.0	0.0	50.8	27.2	68.1	14.7
Prop In Lane	1.00		0.26	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	216	647	651	155	935	417	65	0	587	574	833	706
V/C Ratio(X)	1.17	0.65	0.65	0.74	0.57	1.50	1.32	0.00	0.98	1.27	0.96	0.41
Avail Cap(c_a), veh/h	216	647	651	155	935	417	65	0	587	574	833	706
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.1	41.5	41.5	66.8	50.5	58.4	77.0	0.0	53.6	66.4	42.2	15.5
Incr Delay (d2), s/veh	113.7	5.0	5.0	27.1	2.5	236.0	218.4	0.0	33.5	135.3	23.3	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	17.2	20.6	20.7	9.8	14.5	67.1	11.5	0.0	36.6	33.8	45.3	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	165.8	46.5	46.5	93.9	53.0	294.4	295.4	0.0	87.1	201.7	65.5	17.3
LnGrp LOS	F	D	D	F	D	F	F	A	F	F	E	B
Approach Vol, veh/h	1095			1274			664			1823		
Approach Delay, s/veh	73.9			175.0			114.1			112.2		
Approach LOS	E			F			F			F		
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	16.6	50.4	34.0	59.0		67.0	13.0	80.0				
Change Period (Y+Rc), s	6.8	7.3	6.8	7.0		7.3	7.0	7.0				
Max Green Setting (Gmax), s	9.8	43.1	27.2	52.0		59.7	6.0	73.0				
Max Q Clear Time (g_c+I1), s	11.8	45.1	29.2	52.8		34.1	8.0	70.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		6.3	0.0	1.7				
Intersection Summary												
HCM 6th Ctrl Delay	120.3											
HCM 6th LOS	F											

Arterial Level of Service

Arterial Level of Service: NB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 92	II	45	21.2	87.6	108.8	0.19	6.4	F
I-4 EB On-Ramp	II	35	38.7	289.1	327.8	0.36	3.9	F
I-4 WB off-ramp	II	35	14.7	25.2	39.9	0.12	10.6	F
Total	II		74.6	401.9	476.5	0.67	5.1	F

Arterial Level of Service: SB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-4 WB on-ramp	II	45	30.3	64.8	95.1	0.31	11.6	F
I-4 EB Off-ramp	II	35	14.7	5.8	20.5	0.12	20.7	D
US 92	II	35	38.7	52.3	91.0	0.36	14.2	E
Total	II		83.7	122.9	206.6	0.78	13.6	E

APPENDIX E Build Alternative Operational Analysis

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd/Marathon Gas

Intersection													
Int Delay, s/veh	3.8												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	5	2	33	55	3	7	10	132	263	44	15	470	5
Future Vol, veh/h	5	2	33	55	3	7	10	132	263	44	15	470	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	2	35	58	3	7	11	139	277	46	16	495	5
Major/Minor	Minor2		Minor1		Major1		Major2						
Conflicting Flow All	970	1153	250	881	1132	162	500	500	0	0	323	0	0
Stage 1	530	530	-	600	600	-	-	-	-	-	-	-	-
Stage 2	440	623	-	281	532	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.6	7	7.6	6.6	7	6.5	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4.05	3.35	3.55	4.05	3.35	2.55	2.25	-	-	2.25	-	-
Pot Cap-1 Maneuver	203	192	741	236	197	845	680	1040	-	-	1212	-	-
Stage 1	493	517	-	447	481	-	-	-	-	-	-	-	-
Stage 2	558	469	-	694	516	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-		-	-
Mov Cap-1 Maneuver	173	161	741	195	165	845	998	998	-	-	1212	-	-
Mov Cap-2 Maneuver	173	161	-	195	165	-	-	-	-	-	-	-	-
Stage 1	420	508	-	380	409	-	-	-	-	-	-	-	-
Stage 2	467	399	-	647	507	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB						
HCM Control Delay, s	13.5		30		2.9		0.3						
HCM LOS	B		D										
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR						
Capacity (veh/h)	998	-	-	466	211	1212	-	-					
HCM Lane V/C Ratio	0.15	-	-	0.09	0.324	0.013	-	-					
HCM Control Delay (s)	9.2	-	-	13.5	30	8	0.1	-					
HCM Lane LOS	A	-	-	B	D	A	A	-					
HCM 95th %tile Q(veh)	0.5	-	-	0.3	1.3	0	-	-					

HCM Signalized Intersection Capacity Analysis

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	160	8	232	656	217	0	0	345	223
Future Volume (vph)	0	0	0	160	8	232	656	217	0	0	345	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Lane Util. Factor				0.95	0.95	1.00	0.97	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.94	
Flt Protected				0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1633	1644	1538	3335	3438			3235	
Flt Permitted				0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1633	1644	1538	3335	3438			3235	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	168	8	244	691	228	0	0	363	235
RTOR Reduction (vph)	0	0	0	0	0	185	0	0	0	0	84	0
Lane Group Flow (vph)	0	0	0	87	89	59	691	228	0	0	514	0
Turn Type				Perm	NA	Perm	Prot	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				29.0	29.0	29.0	29.3	79.0			43.7	
Effective Green, g (s)				29.0	29.0	29.0	29.3	79.0			43.7	
Actuated g/C Ratio				0.24	0.24	0.24	0.24	0.66			0.36	
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				394	397	371	814	2263			1178	
v/s Ratio Prot							c0.21	0.07			c0.16	
v/s Ratio Perm				0.05	0.05	0.04						
v/c Ratio				0.22	0.22	0.16	0.85	0.10			0.44	
Uniform Delay, d1				36.4	36.5	35.9	43.2	7.5			28.8	
Progression Factor				1.00	1.00	1.00	0.73	0.40			1.00	
Incremental Delay, d2				1.3	1.3	0.9	8.1	0.1			1.2	
Delay (s)				37.7	37.8	36.8	39.5	3.1			30.0	
Level of Service				D	D	D	D	A			C	
Approach Delay (s)		0.0			37.2			30.5			30.0	
Approach LOS		A			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			31.8									
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			58.7%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	6	490	0	0	0	0	799	338	94	411	0
Future Volume (vph)	74	6	490	0	0	0	0	799	338	94	411	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0					6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00	0.88					0.86	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1729	2707					6225	1538	1719	3438	
Flt Permitted		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1729	2707					6225	1538	1719	3438	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	78	6	516	0	0	0	0	841	356	99	433	0
RTOR Reduction (vph)	0	0	463	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	84	53	0	0	0	0	841	356	99	433	0
Turn Type	Perm	NA	Prot					NA	Free	Prot	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4								Free			
Actuated Green, G (s)		12.4	12.4					70.6	120.0	19.0	95.6	
Effective Green, g (s)		12.4	12.4					70.6	120.0	19.0	95.6	
Actuated g/C Ratio		0.10	0.10					0.59	1.00	0.16	0.80	
Clearance Time (s)		6.0	6.0					6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		178	279					3662	1538	272	2738	
v/s Ratio Prot			0.02					0.14		c0.06	0.13	
v/s Ratio Perm		0.05							c0.23			
v/c Ratio		0.47	0.19					0.23	0.23	0.36	0.16	
Uniform Delay, d1		50.7	49.2					11.8	0.0	45.1	2.8	
Progression Factor		1.00	1.00					0.65	1.00	0.47	2.23	
Incremental Delay, d2		2.0	0.3					0.1	0.3	0.7	0.1	
Delay (s)		52.7	49.5					7.7	0.3	21.9	6.5	
Level of Service		D	D					A	A	C	A	
Approach Delay (s)		50.0			0.0			5.5			9.3	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			17.8		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					18.0		
Intersection Capacity Utilization			58.7%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	88	0	0	60	0	1077	61	0	868	33
Future Vol, veh/h	0	0	88	0	0	60	0	1077	61	0	868	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	93	0	0	63	0	1134	64	0	914	35

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	-	-	475	-	-	567	-	0
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.35	-	-
Pot Cap-1 Maneuver	0	0	536	0	0	459	0	-
Stage 1	0	0	-	0	0	-	0	-
Stage 2	0	0	-	0	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	536	-	-	459	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.1	14.1	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	536	459	-
HCM Lane V/C Ratio	-	-	0.173	0.138	-
HCM Control Delay (s)	-	-	13.1	14.1	-
HCM Lane LOS	-	-	B	B	-
HCM 95th %tile Q(veh)	-	-	0.6	0.5	-

HCM 6th TWSC
20: Branch Forbes Rd & Keene Dr

Intersection								
Int Delay, s/veh	1.6							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	12	10	10	1043	83	863	10	
Future Vol, veh/h	12	10	10	1043	83	863	10	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	-	None	
Storage Length	0	-	150	-	150	-	-	
Veh in Median Storage, #	0	-	-	0	-	0	-	
Grade, %	0	-	-	0	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	
Heavy Vehicles, %	5	5	5	5	5	5	5	
Mvmt Flow	13	11	11	1098	87	908	11	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1659	460	919	0	1098	-	0	
Stage 1	1088	-	-	-	-	-	-	
Stage 2	571	-	-	-	-	-	-	
Critical Hdwy	6.9	7	4.2	-	6.5	-	-	
Critical Hdwy Stg 1	5.9	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.9	-	-	-	-	-	-	
Follow-up Hdwy	3.55	3.35	2.25	-	2.55	-	-	
Pot Cap-1 Maneuver	86	540	720	-	280	-	-	
Stage 1	278	-	-	-	-	-	-	
Stage 2	520	-	-	-	-	-	-	
Platoon blocked, %				-		-	-	
Mov Cap-1 Maneuver	58	540	720	-	280	-	-	
Mov Cap-2 Maneuver	58	-	-	-	-	-	-	
Stage 1	274	-	-	-	-	-	-	
Stage 2	358	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	52.7	0.1		2				
HCM LOS	F							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR		
Capacity (veh/h)	720	-	98	280	-	-		
HCM Lane V/C Ratio	0.015	-	0.236	0.312	-	-		
HCM Control Delay (s)	10.1	-	52.7	23.6	-	-		
HCM Lane LOS	B	-	F	C	-	-		
HCM 95th %tile Q(veh)	0	-	0.9	1.3	-	-		

HCM Signalized Intersection Capacity Analysis

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	300	20	28	461	451	48	422	10	314	341	218
Future Volume (vph)	180	300	20	28	461	451	48	422	10	314	341	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3406		1719	3438	1538	1719	1803		3335	3438	1538
Flt Permitted	0.23	1.00		0.55	1.00	1.00	0.54	1.00		0.95	1.00	1.00
Satd. Flow (perm)	418	3406		993	3438	1538	972	1803		3335	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	189	316	21	29	485	475	51	444	11	331	359	229
RTOR Reduction (vph)	0	5	0	0	0	104	0	1	0	0	0	38
Lane Group Flow (vph)	189	332	0	29	485	371	51	454	0	331	359	191
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	pm+ov
Protected Phases	1	6			2	3		4		3	8	1
Permitted Phases	6			2		2	4					8
Actuated Green, G (s)	39.3	39.3		23.3	23.3	46.9	36.0	36.0		23.6	66.4	75.6
Effective Green, g (s)	39.3	39.3		23.3	23.3	46.9	36.0	36.0		23.6	66.4	75.6
Actuated g/C Ratio	0.33	0.33		0.19	0.19	0.39	0.30	0.30		0.20	0.55	0.63
Clearance Time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Vehicle Extension (s)	3.0	3.5		3.5	3.5	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	236	1115		192	667	601	291	540		655	1902	968
v/s Ratio Prot	c0.06	0.10			0.14	c0.12		c0.25		0.10	0.10	0.02
v/s Ratio Perm	c0.20			0.03		0.12	0.05					0.11
v/c Ratio	0.80	0.30		0.15	0.73	0.62	0.18	0.84		0.51	0.19	0.20
Uniform Delay, d1	32.8	30.1		40.1	45.4	29.4	31.0	39.3		43.0	13.4	9.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.95	0.92	0.93
Incremental Delay, d2	17.5	0.2		0.4	4.1	2.0	1.3	14.7		2.7	0.2	0.1
Delay (s)	50.3	30.2		40.6	49.5	31.3	32.3	54.0		43.7	12.5	8.8
Level of Service	D	C		D	D	C	C	D		D	B	A
Approach Delay (s)		37.4			40.5			51.8			22.8	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			36.4			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				27.9		
Intersection Capacity Utilization			80.4%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

						
Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	87	89	244	691	228	598
v/c Ratio	0.22	0.22	0.44	0.85	0.10	0.47
Control Delay	38.3	38.3	7.2	41.7	3.1	24.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.3	38.3	7.2	41.7	3.1	24.5
Queue Length 50th (ft)	56	58	0	247	32	144
Queue Length 95th (ft)	105	108	65	132	37	207
Internal Link Dist (ft)		1859			540	265
Turn Bay Length (ft)	500		1000			
Base Capacity (vph)	394	397	556	917	2263	1260
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.22	0.44	0.75	0.10	0.47
Intersection Summary						

Queues

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	516	841	356	99	433
v/c Ratio	0.47	0.70	0.23	0.23	0.36	0.16
Control Delay	58.4	9.5	8.0	0.3	24.8	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.4	9.5	8.0	0.3	24.8	7.1
Queue Length 50th (ft)	63	0	55	0	69	72
Queue Length 95th (ft)	110	53	100	m0	122	98
Internal Link Dist (ft)	1782		300			540
Turn Bay Length (ft)		840			260	
Base Capacity (vph)	519	1173	3663	1538	272	2739
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.44	0.23	0.23	0.36	0.16
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Queues

14: Branch Forbes Rd & US 92

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	189	337	29	485	475	51	455	331	359	229
v/c Ratio	0.79	0.30	0.15	0.73	0.60	0.18	0.84	0.50	0.19	0.21
Control Delay	54.8	29.5	40.0	51.7	19.0	33.1	54.6	45.1	13.2	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	29.5	40.0	51.7	19.0	33.1	54.6	45.1	13.2	4.3
Queue Length 50th (ft)	109	99	19	186	173	29	329	127	75	22
Queue Length 95th (ft)	#180	128	44	231	285	63	#502	185	130	104
Internal Link Dist (ft)	2145		2346		476		1019			
Turn Bay Length (ft)	475		325		650	150		525		500
Base Capacity (vph)	238	1386	270	936	787	291	541	656	1902	1091
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.24	0.11	0.52	0.60	0.18	0.84	0.50	0.19	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

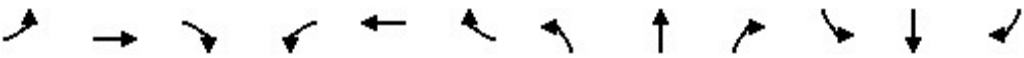
HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd/Marathon Gas

Intersection														
Int Delay, s/veh	3.1													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations														
Traffic Vol, veh/h	20	0	41	31	2	12	7	116	342	24	7	314	10	
Future Vol, veh/h	20	0	41	31	2	12	7	116	342	24	7	314	10	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	100	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95	
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5	
Mvmt Flow	21	0	43	33	2	13	7	122	360	25	7	331	11	
Major/Minor	Minor2		Minor1		Major1			Major2						
Conflicting Flow All	790	994	171	811	987	193	341	342	0	0	385	0	0	
Stage 1	351	351	-	631	631	-	-	-	-	-	-	-	-	
Stage 2	439	643	-	180	356	-	-	-	-	-	-	-	-	
Critical Hdwy	7.6	6.6	7	7.6	6.6	7	6.5	4.2	-	-	4.2	-	-	
Critical Hdwy Stg 1	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-	
Follow-up Hdwy	3.55	4.05	3.35	3.55	4.05	3.35	2.55	2.25	-	-	2.25	-	-	
Pot Cap-1 Maneuver	275	239	834	266	241	807	859	1192	-	-	1149	-	-	
Stage 1	630	623	-	428	465	-	-	-	-	-	-	-	-	
Stage 2	559	459	-	796	620	-	-	-	-	-	-	-	-	
Platoon blocked, %									-	-		-	-	
Mov Cap-1 Maneuver	244	211	834	229	213	807	1162	1162	-	-	1149	-	-	
Mov Cap-2 Maneuver	244	211	-	229	213	-	-	-	-	-	-	-	-	
Stage 1	560	618	-	380	413	-	-	-	-	-	-	-	-	
Stage 2	487	408	-	749	615	-	-	-	-	-	-	-	-	
Approach	EB		WB		NB			SB						
HCM Control Delay, s	14		20.3		2.1			0.2						
HCM LOS	B		C											
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR							
Capacity (veh/h)	1162	-	-	465	282	1149	-	-						
HCM Lane V/C Ratio	0.111	-	-	0.138	0.168	0.006	-	-						
HCM Control Delay (s)	8.5	-	-	14	20.3	8.2	0	-						
HCM Lane LOS	A	-	-	B	C	A	A	-						
HCM 95th %tile Q(veh)	0.4	-	-	0.5	0.6	0	-	-						

HCM Signalized Intersection Capacity Analysis

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	291	3	217	382	272	0	0	300	93
Future Volume (vph)	0	0	0	291	3	217	382	272	0	0	300	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Lane Util. Factor				0.95	0.95	1.00	0.97	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1633	1639	1538	3335	3438			3316	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1633	1639	1538	3335	3438			3316	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	306	3	228	402	286	0	0	316	98
RTOR Reduction (vph)	0	0	0	0	0	160	0	0	0	0	22	0
Lane Group Flow (vph)	0	0	0	153	156	68	402	286	0	0	392	0
Turn Type				Perm	NA	Perm	Prot	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				39.0	39.0	39.0	29.0	79.0			44.0	
Effective Green, g (s)				39.0	39.0	39.0	29.0	79.0			44.0	
Actuated g/C Ratio				0.30	0.30	0.30	0.22	0.61			0.34	
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				489	491	461	743	2089			1122	
v/s Ratio Prot							c0.12	0.08			c0.12	
v/s Ratio Perm				0.09	0.10	0.04						
v/c Ratio				0.31	0.32	0.15	0.54	0.14			0.35	
Uniform Delay, d1				35.1	35.2	33.3	44.6	10.9			32.3	
Progression Factor				1.00	1.00	1.00	0.51	0.29			1.00	
Incremental Delay, d2				1.7	1.7	0.7	0.8	0.1			0.9	
Delay (s)				36.8	36.9	34.0	23.7	3.3			33.1	
Level of Service				D	D	C	C	A			C	
Approach Delay (s)		0.0			35.7			15.2			33.1	
Approach LOS		A			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			26.4									
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			130.0									
Intersection Capacity Utilization			50.9%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	4	608	0	0	0	0	546	316	82	509	0
Future Volume (vph)	108	4	608	0	0	0	0	546	316	82	509	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0					6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00	0.88					0.86	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					6225	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1726	2707					6225	1538	1719	3438	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	114	4	640	0	0	0	0	575	333	86	536	0
RTOR Reduction (vph)	0	0	520	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	118	120	0	0	0	0	575	333	86	536	0
Turn Type	Perm	NA	Prot					NA	Free	Prot	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4								Free			
Actuated Green, G (s)		16.3	16.3					83.9	130.0	11.8	101.7	
Effective Green, g (s)		16.3	16.3					83.9	130.0	11.8	101.7	
Actuated g/C Ratio		0.13	0.13					0.65	1.00	0.09	0.78	
Clearance Time (s)		6.0	6.0					6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		216	339					4017	1538	156	2689	
v/s Ratio Prot			0.04					0.09		c0.05	0.16	
v/s Ratio Perm		0.07							c0.22			
v/c Ratio		0.55	0.35					0.14	0.22	0.55	0.20	
Uniform Delay, d1		53.4	52.0					9.0	0.0	56.6	3.6	
Progression Factor		1.00	1.00					1.66	1.00	0.63	0.66	
Incremental Delay, d2		2.8	0.6					0.1	0.3	4.0	0.2	
Delay (s)		56.2	52.7					15.0	0.3	39.5	2.6	
Level of Service		E	D					B	A	D	A	
Approach Delay (s)		53.2			0.0			9.6			7.7	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			23.5		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.31									
Actuated Cycle Length (s)			130.0		Sum of lost time (s)					18.0		
Intersection Capacity Utilization			50.9%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↗↗	↗		↗↗	
Traffic Vol, veh/h	0	0	63	0	0	51	0	811	85	0	1081	36
Future Vol, veh/h	0	0	63	0	0	51	0	811	85	0	1081	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	66	0	0	54	0	854	89	0	1138	38

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	-	-	588	-	-	427	-	0
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.35	-	-
Pot Cap-1 Maneuver	0	0	452	0	0	568	0	-
Stage 1	0	0	-	0	0	-	0	-
Stage 2	0	0	-	0	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	452	-	-	568	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.3	12	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	452 568	-	-
HCM Lane V/C Ratio	-	-	0.147 0.095	-	-
HCM Control Delay (s)	-	-	14.3 12	-	-
HCM Lane LOS	-	-	B B	-	-
HCM 95th %tile Q(veh)	-	-	0.5 0.3	-	-

HCM 6th TWSC
20: Branch Forbes Rd & Keene Dr

Intersection								
Int Delay, s/veh	1.2							
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations								
Traffic Vol, veh/h	8	10	17	798	90	1044	10	
Future Vol, veh/h	8	10	17	798	90	1044	10	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	-	None	
Storage Length	0	-	150	-	150	-	-	
Veh in Median Storage, #	0	-	-	0	-	0	-	
Grade, %	0	-	-	0	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	
Heavy Vehicles, %	5	5	5	5	5	5	5	
Mvmt Flow	8	11	18	840	95	1099	11	
Major/Minor	Minor2	Major1		Major2				
Conflicting Flow All	1751	555	1110	0	840	-	0	
Stage 1	1295	-	-	-	-	-	-	
Stage 2	456	-	-	-	-	-	-	
Critical Hdwy	6.9	7	4.2	-	6.5	-	-	
Critical Hdwy Stg 1	5.9	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.9	-	-	-	-	-	-	
Follow-up Hdwy	3.55	3.35	2.25	-	2.55	-	-	
Pot Cap-1 Maneuver	74	468	608	-	411	-	-	
Stage 1	215	-	-	-	-	-	-	
Stage 2	596	-	-	-	-	-	-	
Platoon blocked, %				-		-	-	
Mov Cap-1 Maneuver	55	468	608	-	411	-	-	
Mov Cap-2 Maneuver	55	-	-	-	-	-	-	
Stage 1	209	-	-	-	-	-	-	
Stage 2	458	-	-	-	-	-	-	
Approach	EB	NB		SB				
HCM Control Delay, s	45.3	0.2		1.3				
HCM LOS	E							
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR		
Capacity (veh/h)	608	-	108	411	-	-		
HCM Lane V/C Ratio	0.029	-	0.175	0.231	-	-		
HCM Control Delay (s)	11.1	-	45.3	16.4	-	-		
HCM Lane LOS	B	-	E	C	-	-		
HCM 95th %tile Q(veh)	0.1	-	0.6	0.9	-	-		

HCM Signalized Intersection Capacity Analysis

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	422	63	66	307	358	49	312	19	421	464	169
Future Volume (vph)	145	422	63	66	307	358	49	312	19	421	464	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3371		1719	3438	1538	1719	1794		3335	3438	1538
Flt Permitted	0.32	1.00		0.46	1.00	1.00	0.47	1.00		0.95	1.00	1.00
Satd. Flow (perm)	577	3371		840	3438	1538	858	1794		3335	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	153	444	66	69	323	377	52	328	20	443	488	178
RTOR Reduction (vph)	0	11	0	0	0	152	0	1	0	0	0	55
Lane Group Flow (vph)	153	499	0	69	323	225	52	347	0	443	488	123
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	pm+ov
Protected Phases	1	6			2	3		4		3	8	1
Permitted Phases	6			2		2	4					8
Actuated Green, G (s)	36.8	36.8		19.1	19.1	56.2	35.0	35.0		37.1	78.9	89.8
Effective Green, g (s)	36.8	36.8		19.1	19.1	56.2	35.0	35.0		37.1	78.9	89.8
Actuated g/C Ratio	0.28	0.28		0.15	0.15	0.43	0.27	0.27		0.29	0.61	0.69
Clearance Time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Vehicle Extension (s)	3.0	3.5		3.5	3.5	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	259	954		123	505	664	231	483		951	2086	1062
v/s Ratio Prot	0.05	c0.15			0.09	0.10		c0.19		c0.13	0.14	0.01
v/s Ratio Perm	c0.12			0.08		0.05	0.06					0.07
v/c Ratio	0.59	0.52		0.56	0.64	0.34	0.23	0.72		0.47	0.23	0.12
Uniform Delay, d1	37.2	39.2		51.6	52.2	24.6	37.0	43.0		38.3	11.7	6.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.74	0.99	4.36
Incremental Delay, d2	3.6	0.6		6.2	2.8	0.4	2.2	8.8		1.6	0.3	0.0
Delay (s)	40.8	39.8		57.8	55.0	24.9	39.2	51.9		30.0	11.8	29.5
Level of Service	D	D		E	D	C	D	D		C	B	C
Approach Delay (s)		40.0			40.5			50.2			21.9	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			34.7									
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			130.0									
Intersection Capacity Utilization			79.4%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

						
Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	153	156	228	402	286	414
v/c Ratio	0.31	0.32	0.37	0.54	0.14	0.36
Control Delay	37.3	37.4	6.0	25.8	3.3	30.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	37.4	6.0	25.8	3.3	30.7
Queue Length 50th (ft)	105	107	0	165	16	126
Queue Length 95th (ft)	169	172	60	44	20	172
Internal Link Dist (ft)		1859			540	265
Turn Bay Length (ft)	500		1000			
Base Capacity (vph)	489	491	621	743	2089	1144
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.32	0.37	0.54	0.14	0.36
Intersection Summary						

Queues

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	118	640	575	333	86	536
v/c Ratio	0.55	0.75	0.14	0.22	0.55	0.20
Control Delay	61.8	11.6	16.6	0.3	47.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.8	11.6	16.6	0.3	47.7	2.8
Queue Length 50th (ft)	95	19	80	0	25	27
Queue Length 95th (ft)	150	79	113	0	56	72
Internal Link Dist (ft)	1782		300			540
Turn Bay Length (ft)		840			260	
Base Capacity (vph)	544	1261	4016	1538	212	2689
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.51	0.14	0.22	0.41	0.20
Intersection Summary						

Queues

14: Branch Forbes Rd & US 92

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	153	510	69	323	377	52	348	443	488	178
v/c Ratio	0.59	0.53	0.56	0.64	0.43	0.23	0.72	0.47	0.23	0.15
Control Delay	45.1	39.6	68.4	57.9	7.5	40.2	52.4	30.9	12.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	39.6	68.4	57.9	7.5	40.2	52.4	30.9	12.4	4.0
Queue Length 50th (ft)	102	186	55	137	50	34	265	140	105	12
Queue Length 95th (ft)	150	222	102	176	123	72	379	196	160	58
Internal Link Dist (ft)	2145		2346		476		1019			
Turn Bay Length (ft)	475		325		650	150		525		500
Base Capacity (vph)	263	1454	243	997	887	231	484	952	2087	1194
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.35	0.28	0.32	0.43	0.23	0.72	0.47	0.23	0.15
Intersection Summary										

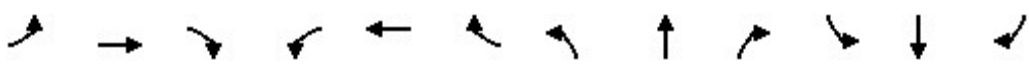
HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd/Marathon Gas

Intersection													
Int Delay, s/veh	18.5												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	9	4	57	64	3	8	16	217	436	72	24	758	8
Future Vol, veh/h	9	4	57	64	3	8	16	217	436	72	24	758	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	9	4	60	67	3	8	17	228	459	76	25	798	8
Major/Minor	Minor2		Minor1		Major1		Major2						
Conflicting Flow All	1573	1877	403	1438	1843	268	806	806	0	0	535	0	0
Stage 1	852	852	-	987	987	-	-	-	-	-	-	-	-
Stage 2	721	1025	-	451	856	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.6	7	7.6	6.6	7	6.5	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4.05	3.35	3.55	4.05	3.35	2.55	2.25	-	-	2.25	-	-
Pot Cap-1 Maneuver	72	68	589	91	72	721	432	795	-	-	1008	-	-
Stage 1	314	367	-	260	317	-	-	-	-	-	-	-	-
Stage 2	378	304	-	550	366	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-		-	-
Mov Cap-1 Maneuver	49	44	589	~ 55	46	721	742	742	-	-	1008	-	-
Mov Cap-2 Maneuver	49	44	-	~ 55	46	-	-	-	-	-	-	-	-
Stage 1	210	350	-	174	212	-	-	-	-	-	-	-	-
Stage 2	247	204	-	466	350	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB						
HCM Control Delay, s	36		\$ 337.5		3.8		0.5						
HCM LOS	E		F										
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR						
Capacity (veh/h)	742	-	-	188	60	1008	-	-					
HCM Lane V/C Ratio	0.331	-	-	0.392	1.316	0.025	-	-					
HCM Control Delay (s)	12.2	-	-	36\$	337.5	8.7	0.2	-					
HCM Lane LOS	B	-	-	E	F	A	A	-					
HCM 95th %tile Q(veh)	1.4	-	-	1.7	6.8	0.1	-	-					
Notes													
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon							

HCM Signalized Intersection Capacity Analysis

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	264	13	383	1083	358	0	0	543	352
Future Volume (vph)	0	0	0	264	13	383	1083	358	0	0	543	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Lane Util. Factor				0.95	0.95	1.00	0.97	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.94	
Flt Protected				0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1633	1645	1538	3335	3438			3235	
Flt Permitted				0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1633	1645	1538	3335	3438			3235	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	278	14	403	1140	377	0	0	572	371
RTOR Reduction (vph)	0	0	0	0	0	332	0	0	0	0	80	0
Lane Group Flow (vph)	0	0	0	145	147	71	1140	377	0	0	863	0
Turn Type				Perm	NA	Perm	Prot	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				23.0	23.0	23.0	49.2	95.0			39.8	
Effective Green, g (s)				23.0	23.0	23.0	49.2	95.0			39.8	
Actuated g/C Ratio				0.18	0.18	0.18	0.38	0.73			0.31	
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				288	291	272	1262	2512			990	
v/s Ratio Prot							c0.34	0.11			c0.27	
v/s Ratio Perm				0.09	0.09	0.05						
v/c Ratio				0.50	0.51	0.26	0.90	0.15			0.87	
Uniform Delay, d1				48.3	48.4	46.2	38.2	5.3			42.7	
Progression Factor				1.00	1.00	1.00	0.40	0.49			1.00	
Incremental Delay, d2				6.2	6.1	2.3	8.5	0.1			10.5	
Delay (s)				54.5	54.5	48.5	23.7	2.7			53.2	
Level of Service				D	D	D	C	A			D	
Approach Delay (s)		0.0			51.0			18.5			53.2	
Approach LOS		A			D			B			D	
Intersection Summary												
HCM 2000 Control Delay			36.0				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			80.5%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	9	800	0	0	0	0	1320	559	150	657	0
Future Volume (vph)	121	9	800	0	0	0	0	1320	559	150	657	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0					6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00	0.88					0.86	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1729	2707					6225	1538	1719	3438	
Flt Permitted		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1729	2707					6225	1538	1719	3438	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	127	9	842	0	0	0	0	1389	588	158	692	0
RTOR Reduction (vph)	0	0	308	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	136	534	0	0	0	0	1389	588	158	692	0
Turn Type	Perm	NA	Prot					NA	Free	Prot	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4								Free			
Actuated Green, G (s)		32.3	32.3					63.0	130.0	16.7	85.7	
Effective Green, g (s)		32.3	32.3					63.0	130.0	16.7	85.7	
Actuated g/C Ratio		0.25	0.25					0.48	1.00	0.13	0.66	
Clearance Time (s)		6.0	6.0					6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		429	672					3016	1538	220	2266	
v/s Ratio Prot			c0.20					c0.22		c0.09	0.20	
v/s Ratio Perm		0.08							0.38			
v/c Ratio		0.32	0.79					0.46	0.38	0.72	0.31	
Uniform Delay, d1		39.9	45.7					22.2	0.0	54.4	9.5	
Progression Factor		1.00	1.00					0.91	1.00	0.34	0.48	
Incremental Delay, d2		0.4	6.4					0.0	0.1	5.1	0.2	
Delay (s)		40.3	52.2					20.3	0.1	23.7	4.7	
Level of Service		D	D					C	A	C	A	
Approach Delay (s)		50.5			0.0			14.3			8.3	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			22.3		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			130.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			80.5%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕	↗		↕	
Traffic Vol, veh/h	0	0	148	0	0	100	0	1779	102	0	1404	53
Future Vol, veh/h	0	0	148	0	0	100	0	1779	102	0	1404	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	156	0	0	105	0	1873	107	0	1478	56
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	767	-	-	937	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.35	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	345	0	0	260	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	345	-	-	260	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	23.7		28		0		0					
HCM LOS	C		D									
Minor Lane/Major Mvmt	NBT		NBR EBLn1WBLn1		SBT SBR							
Capacity (veh/h)	-		345 260		-							
HCM Lane V/C Ratio	-		0.452 0.405		-							
HCM Control Delay (s)	-		23.7 28		-							
HCM Lane LOS	-		C D		-							
HCM 95th %tile Q(veh)	-		2.3 1.9		-							

HCM 6th TWSC
20: Branch Forbes Rd & Keene Dr

Intersection							
Int Delay, s/veh	16.8						
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	12	10	17	1727	142	1400	10
Future Vol, veh/h	12	10	17	1727	142	1400	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	150	-	150	-	-
Veh in Median Storage, #	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5
Mvmt Flow	13	11	18	1818	149	1474	11
Major/Minor	Minor2	Major1		Major2			
Conflicting Flow All	2723	743	1485	0	1818	-	0
Stage 1	1778	-	-	-	-	-	-
Stage 2	945	-	-	-	-	-	-
Critical Hdwy	6.9	7	4.2	-	6.5	-	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-	-
Follow-up Hdwy	3.55	3.35	2.25	-	2.55	-	-
Pot Cap-1 Maneuver	16	351	434	-	~ 94	-	-
Stage 1	117	-	-	-	-	-	-
Stage 2	331	-	-	-	-	-	-
Platoon blocked, %				-		-	-
Mov Cap-1 Maneuver	0	351	434	-	~ 94	-	-
Mov Cap-2 Maneuver	0	-	-	-	-	-	-
Stage 1	112	-	-	-	-	-	-
Stage 2	0	-	-	-	-	-	-
Approach	EB	NB		SB			
HCM Control Delay, s	16	0.1		35.5			
HCM LOS	C						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR	
Capacity (veh/h)	434	-	351	~ 94	-	-	
HCM Lane V/C Ratio	0.041	-	0.066	1.59	-	-	
HCM Control Delay (s)	13.7	-	16	388.3	-	-	
HCM Lane LOS	B	-	C	F	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	11.7	-	-	
Notes							
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM Signalized Intersection Capacity Analysis

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	486	32	46	755	739	81	713	16	508	550	352
Future Volume (vph)	292	486	32	46	755	739	81	713	16	508	550	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3406		1719	3438	1538	1719	1804		3335	3438	1538
Flt Permitted	0.11	1.00		0.45	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	193	3406		811	3438	1538	1719	1804		3335	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	307	512	34	48	795	778	85	751	17	535	579	371
RTOR Reduction (vph)	0	4	0	0	0	79	0	1	0	0	0	64
Lane Group Flow (vph)	307	542	0	48	795	699	85	767	0	535	579	307
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	1	6			2	3	7	4		3	8	1
Permitted Phases	6			2		2						8
Actuated Green, G (s)	50.7	50.7		30.7	30.7	60.9	13.0	28.0		30.2	45.0	58.2
Effective Green, g (s)	50.7	50.7		30.7	30.7	60.9	13.0	28.0		30.2	45.0	58.2
Actuated g/C Ratio	0.39	0.39		0.24	0.24	0.47	0.10	0.22		0.23	0.35	0.45
Clearance Time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Vehicle Extension (s)	3.0	3.5		3.5	3.5	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	230	1328		191	811	720	171	388		774	1190	688
v/s Ratio Prot	c0.14	0.16			0.23	c0.23	0.05	c0.43		0.16	0.17	0.05
v/s Ratio Perm	c0.38			0.06		0.23						0.15
v/c Ratio	1.33	0.41		0.25	0.98	0.97	0.50	1.98		0.69	0.49	0.45
Uniform Delay, d1	36.6	28.8		40.3	49.3	33.7	55.4	51.0		45.6	33.4	24.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.72	0.76	1.25
Incremental Delay, d2	177.2	0.2		0.8	26.7	26.4	2.3	449.0		4.5	1.3	0.4
Delay (s)	213.8	29.0		41.1	76.1	60.1	57.7	500.0		37.4	26.8	31.3
Level of Service	F	C		D	E	E	E	F		D	C	C
Approach Delay (s)		95.5			67.4			455.9			31.7	
Approach LOS		F			E			F			C	
Intersection Summary												
HCM 2000 Control Delay	130.2			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.44											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)					28.1			
Intersection Capacity Utilization	117.6%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

Queues

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

						
Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	145	147	403	1140	377	943
v/c Ratio	0.50	0.51	0.67	0.90	0.15	0.88
Control Delay	55.2	55.2	10.4	25.3	2.7	48.6
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	55.2	55.2	10.4	25.4	2.7	48.6
Queue Length 50th (ft)	117	118	0	460	28	363
Queue Length 95th (ft)	191	194	98	219	2	#502
Internal Link Dist (ft)		1859			540	265
Turn Bay Length (ft)	500		1000			
Base Capacity (vph)	288	291	603	1334	2512	1071
Starvation Cap Reductn	0	0	0	7	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.51	0.67	0.86	0.15	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	136	842	1389	588	158	692
v/c Ratio	0.32	0.86	0.46	0.38	0.72	0.31
Control Delay	39.9	32.3	22.0	0.1	27.3	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	32.3	22.0	0.1	27.3	5.3
Queue Length 50th (ft)	93	210	242	0	80	91
Queue Length 95th (ft)	138	276	m229	m0	m118	m186
Internal Link Dist (ft)	1782		300			540
Turn Bay Length (ft)		840			260	
Base Capacity (vph)	558	1152	3016	1538	277	2265
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.73	0.46	0.38	0.57	0.31
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Queues

14: Branch Forbes Rd & US 92

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	546	48	795	778	85	768	535	579	371
v/c Ratio	1.33	0.41	0.25	0.98	0.89	0.50	1.97	0.69	0.49	0.49
Control Delay	204.4	29.6	44.6	76.5	35.7	66.1	475.7	37.6	27.0	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	204.4	29.6	44.6	76.5	35.7	66.1	475.7	37.6	27.0	13.4
Queue Length 50th (ft)	~286	172	33	352	482	69	~1013	197	201	152
Queue Length 95th (ft)	#474	222	71	#487	#774	126	#1261	259	240	230
Internal Link Dist (ft)		2145		2346			476		1019	
Turn Bay Length (ft)	475		325		650	150		525		500
Base Capacity (vph)	231	1332	191	811	877	171	389	774	1190	754
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.33	0.41	0.25	0.98	0.89	0.50	1.97	0.69	0.49	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Arterial Level of Service

Arterial Level of Service: NB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 92	II	45	21.1	475.7	496.8	0.19	1.4	F
I-4 EB on-ramp	II	35	38.8	22.0	60.8	0.36	21.3	D
I-4 WB off-ramp	II	35	14.7	2.7	17.4	0.12	24.3	C
Total	II		74.6	500.4	575.0	0.67	4.2	F

Arterial Level of Service: SB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-4 WB on-ramp	II	45	30.3	48.6	78.9	0.31	14.0	E
I-4 EB off-ramp	II	35	14.7	5.3	20.0	0.12	21.1	D
US 92	II	35	38.8	27.0	65.8	0.36	19.6	D
Total	II		83.8	80.9	164.7	0.78	17.1	D

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd/Marathon Gas

Intersection													
Int Delay, s/veh	7.2												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	33	0	68	41	3	16	11	190	563	40	11	513	16
Future Vol, veh/h	33	0	68	41	3	16	11	190	563	40	11	513	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	35	0	72	43	3	17	12	200	593	42	12	540	17
Major/Minor	Minor2		Minor1		Major1		Major2						
Conflicting Flow All	1295	1632	279	1332	1619	318	557	557	0	0	635	0	0
Stage 1	573	573	-	1038	1038	-	-	-	-	-	-	-	-
Stage 2	722	1059	-	294	581	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.6	7	7.6	6.6	7	6.5	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4.05	3.35	3.55	4.05	3.35	2.55	2.25	-	-	2.25	-	-
Pot Cap-1 Maneuver	117	97	709	109	99	669	625	989	-	-	924	-	-
Stage 1	464	495	-	242	300	-	-	-	-	-	-	-	-
Stage 2	377	293	-	681	490	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-		-	-
Mov Cap-1 Maneuver	90	74	709	80	75	669	950	950	-	-	924	-	-
Mov Cap-2 Maneuver	90	74	-	80	75	-	-	-	-	-	-	-	-
Stage 1	361	486	-	188	233	-	-	-	-	-	-	-	-
Stage 2	282	228	-	601	481	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB						
HCM Control Delay, s	36.3		82.7		2.5		0.3						
HCM LOS	E		F										
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR						
Capacity (veh/h)	950	-	-	218	104	924	-	-					
HCM Lane V/C Ratio	0.223	-	-	0.488	0.607	0.013	-	-					
HCM Control Delay (s)	9.9	-	-	36.3	82.7	8.9	0.1	-					
HCM Lane LOS	A	-	-	E	F	A	A	-					
HCM 95th %tile Q(veh)	0.9	-	-	2.4	2.9	0	-	-					

HCM Signalized Intersection Capacity Analysis

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	473	4	353	634	451	0	0	484	149
Future Volume (vph)	0	0	0	473	4	353	634	451	0	0	484	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Lane Util. Factor				0.95	0.95	1.00	0.97	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1633	1638	1538	3335	3438			3317	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1633	1638	1538	3335	3438			3317	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	498	4	372	667	475	0	0	509	157
RTOR Reduction (vph)	0	0	0	0	0	271	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	249	253	101	667	475	0	0	647	0
Turn Type				Perm	NA	Perm	Prot	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				38.0	38.0	38.0	33.6	90.0			50.4	
Effective Green, g (s)				38.0	38.0	38.0	33.6	90.0			50.4	
Actuated g/C Ratio				0.27	0.27	0.27	0.24	0.64			0.36	
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				443	444	417	800	2210			1194	
v/s Ratio Prot							c0.20	0.14			c0.20	
v/s Ratio Perm				0.15	0.15	0.07						
v/c Ratio				0.56	0.57	0.24	0.83	0.21			0.54	
Uniform Delay, d1				43.8	44.0	39.8	50.5	10.4			35.6	
Progression Factor				1.00	1.00	1.00	0.33	0.61			1.00	
Incremental Delay, d2				5.1	5.2	1.4	6.9	0.2			1.8	
Delay (s)				48.9	49.2	41.1	23.5	6.5			37.3	
Level of Service				D	D	D	C	A			D	
Approach Delay (s)		0.0			45.7			16.5			37.3	
Approach LOS		A			D			B			D	
Intersection Summary												
HCM 2000 Control Delay			31.2				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			68.0%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	179	6	1006	0	0	0	0	906	526	133	824	0	
Future Volume (vph)	179	6	1006	0	0	0	0	906	526	133	824	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.0	6.0					6.0	4.0	6.0	6.0		
Lane Util. Factor		1.00	0.88					0.86	1.00	1.00	0.95		
Frt		1.00	0.85					1.00	0.85	1.00	1.00		
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1726	2707					6225	1538	1719	3438		
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1726	2707					6225	1538	1719	3438		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	188	6	1059	0	0	0	0	954	554	140	867	0	
RTOR Reduction (vph)	0	0	114	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	194	945	0	0	0	0	954	554	140	867	0	
Turn Type	Perm	NA	Perm					NA	Free	Prot	NA		
Protected Phases		4						2		1	6		
Permitted Phases	4		4						Free				
Actuated Green, G (s)		54.9	54.9					51.0	140.0	16.1	73.1		
Effective Green, g (s)		54.9	54.9					51.0	140.0	16.1	73.1		
Actuated g/C Ratio		0.39	0.39					0.36	1.00	0.12	0.52		
Clearance Time (s)		6.0	6.0					6.0		6.0	6.0		
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0		
Lane Grp Cap (vph)		676	1061					2267	1538	197	1795		
v/s Ratio Prot								0.15		c0.08	c0.25		
v/s Ratio Perm		0.11	c0.35						0.36				
v/c Ratio		0.29	0.89					0.42	0.36	0.71	0.48		
Uniform Delay, d1		29.1	39.8					33.4	0.0	59.7	21.4		
Progression Factor		1.00	1.00					0.81	1.00	0.49	0.53		
Incremental Delay, d2		0.2	9.6					0.3	0.3	9.8	0.8		
Delay (s)		29.4	49.3					27.4	0.3	38.9	12.1		
Level of Service		C	D					C	A	D	B		
Approach Delay (s)		46.2			0.0			17.5			15.8		
Approach LOS		D			A			B			B		
Intersection Summary													
HCM 2000 Control Delay			26.6		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.71										
Actuated Cycle Length (s)			140.0		Sum of lost time (s)					18.0			
Intersection Capacity Utilization			68.0%		ICU Level of Service					C			
Analysis Period (min)			15										
c Critical Lane Group													

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕	↗		↕	
Traffic Vol, veh/h	0	0	122	0	0	81	0	1351	139	0	1770	60
Future Vol, veh/h	0	0	122	0	0	81	0	1351	139	0	1770	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	128	0	0	85	0	1422	146	0	1863	63
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	963	-	-	711	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.35	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	256	0	0	369	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	256	-	-	369	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	32.4		17.7		0		0					
HCM LOS	D		C									
Minor Lane/Major Mvmt	NBT		NBR EBLn1WBLn1		SBT		SBR					
Capacity (veh/h)	-		256 369		-		-					
HCM Lane V/C Ratio	-		0.502 0.231		-		-					
HCM Control Delay (s)	-		32.4 17.7		-		-					
HCM Lane LOS	-		D C		-		-					
HCM 95th %tile Q(veh)	-		2.6 0.9		-		-					

HCM 6th TWSC
20: Branch Forbes Rd & Keene Dr

Intersection							
Int Delay, s/veh	44.2						
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	8	10	27	1322	160	1722	10
Future Vol, veh/h	8	10	27	1322	160	1722	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	150	-	150	-	-
Veh in Median Storage, #	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5
Mvmt Flow	8	11	28	1392	168	1813	11
Major/Minor	Minor2	Major1		Major2			
Conflicting Flow All	2907	912	1824	0	1392	-	0
Stage 1	2155	-	-	-	-	-	-
Stage 2	752	-	-	-	-	-	-
Critical Hdwy	6.9	7	4.2	-	6.5	-	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-	-
Follow-up Hdwy	3.55	3.35	2.25	-	2.55	-	-
Pot Cap-1 Maneuver	12	271	319	-	180	-	-
Stage 1	72	-	-	-	-	-	-
Stage 2	419	-	-	-	-	-	-
Platoon blocked, %				-	-	-	-
Mov Cap-1 Maneuver	~ 1	271	319	-	180	-	-
Mov Cap-2 Maneuver	~ 1	-	-	-	-	-	-
Stage 1	66	-	-	-	-	-	-
Stage 2	28	-	-	-	-	-	-
Approach	EB	NB		SB			
HCM Control Delay, \$	7074.4	0.3		8.7			
HCM LOS	F						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR	
Capacity (veh/h)	319	-	2	180	-	-	
HCM Lane V/C Ratio	0.089	-	9.474	0.936	-	-	
HCM Control Delay (s)	17.4	\$	7074.4	103.4	-	-	
HCM Lane LOS	C	-	F	F	-	-	
HCM 95th %tile Q(veh)	0.3	-	3.9	7.3	-	-	
Notes							
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM Signalized Intersection Capacity Analysis

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	697	104	109	508	593	82	517	32	693	762	277
Future Volume (vph)	239	697	104	109	508	593	82	517	32	693	762	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3371		1719	3438	1538	1719	1794		3335	3438	1538
Flt Permitted	0.21	1.00		0.29	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	388	3371		516	3438	1538	1719	1794		3335	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	252	734	109	115	535	624	86	544	34	729	802	292
RTOR Reduction (vph)	0	8	0	0	0	79	0	1	0	0	0	41
Lane Group Flow (vph)	252	835	0	115	535	545	86	577	0	729	802	251
Turn Type	pm+pt	NA		Perm	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	1	6			2	3	7	4		3	8	1
Permitted Phases	6			2		2						8
Actuated Green, G (s)	48.7	48.7		30.7	30.7	60.9	7.0	40.0		30.2	63.0	74.2
Effective Green, g (s)	48.7	48.7		30.7	30.7	60.9	7.0	40.0		30.2	63.0	74.2
Actuated g/C Ratio	0.35	0.35		0.22	0.22	0.43	0.05	0.29		0.22	0.45	0.53
Clearance Time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Vehicle Extension (s)	3.0	3.5		3.5	3.5	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	241	1172		113	753	669	85	512		719	1547	815
v/s Ratio Prot	c0.08	0.25			0.16	0.18	0.05	c0.32		c0.22	0.23	0.02
v/s Ratio Perm	c0.28			0.22		0.18						0.14
v/c Ratio	1.05	0.71		1.02	0.71	0.82	1.01	1.13		1.01	0.52	0.31
Uniform Delay, d1	41.6	39.6		54.6	50.5	34.6	66.5	50.0		54.9	27.6	18.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.76	1.11	1.12
Incremental Delay, d2	70.4	2.1		89.5	3.3	7.8	100.9	79.2		32.9	1.0	0.2
Delay (s)	112.0	41.7		144.1	53.8	42.4	167.4	129.2		74.8	31.8	20.9
Level of Service	F	D		F	D	D	F	F		E	C	C
Approach Delay (s)		57.9			56.4			134.2			47.2	
Approach LOS		E			E			F			D	
Intersection Summary												
HCM 2000 Control Delay	63.9			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	1.10											
Actuated Cycle Length (s)	140.0			Sum of lost time (s)			28.1					
Intersection Capacity Utilization	107.7%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

						
Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	249	253	372	667	475	666
v/c Ratio	0.56	0.57	0.54	0.83	0.21	0.55
Control Delay	49.7	49.9	6.9	25.7	6.6	36.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	49.9	6.9	25.7	6.6	36.9
Queue Length 50th (ft)	206	210	0	285	110	241
Queue Length 95th (ft)	305	309	82	371	80	332
Internal Link Dist (ft)		1859			540	265
Turn Bay Length (ft)	500		1000			
Base Capacity (vph)	443	444	688	1000	2210	1213
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.57	0.54	0.67	0.21	0.55
Intersection Summary						

Queues

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	194	1059	954	554	140	867
v/c Ratio	0.29	0.90	0.42	0.36	0.71	0.48
Control Delay	29.6	43.6	28.6	0.3	45.8	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3
Total Delay	29.6	43.6	28.6	0.3	45.8	12.9
Queue Length 50th (ft)	116	424	176	0	129	182
Queue Length 95th (ft)	174	527	m208	m0	209	216
Internal Link Dist (ft)	1782		300			540
Turn Bay Length (ft)		840			260	
Base Capacity (vph)	727	1249	2266	1538	245	1794
Starvation Cap Reductn	0	0	0	0	0	389
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.85	0.42	0.36	0.57	0.62
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Queues

14: Branch Forbes Rd & US 92

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	252	843	115	535	624	86	578	729	802	292
v/c Ratio	1.04	0.71	1.02	0.71	0.76	1.01	1.13	1.01	0.52	0.34
Control Delay	106.6	43.0	143.0	56.5	29.4	165.0	124.5	75.0	32.0	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	106.6	43.0	143.0	56.5	29.4	165.0	124.5	75.0	32.0	9.0
Queue Length 50th (ft)	~184	344	~108	239	363	~80	~607	~332	326	66
Queue Length 95th (ft)	#322	423	#241	305	532	#197	#843	#484	393	m113
Internal Link Dist (ft)		2145		2346			476		1019	
Turn Bay Length (ft)	475		325		650	150		525		500
Base Capacity (vph)	242	1181	113	753	820	85	513	719	1547	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.71	1.02	0.71	0.76	1.01	1.13	1.01	0.52	0.34
Intersection Summary										
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.										
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.										
m Volume for 95th percentile queue is metered by upstream signal.										

Arterial Level of Service

Arterial Level of Service: NB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 92	II	45	21.1	124.5	145.6	0.19	4.8	F
I-4 EB on-ramp	II	35	38.8	28.6	67.4	0.36	19.2	D
I-4 WB off-ramp	II	35	14.7	6.6	21.3	0.12	19.8	D
Total	II		74.6	159.7	234.3	0.67	10.3	F

Arterial Level of Service: SB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-4 WB on-ramp	II	45	30.3	36.9	67.2	0.31	16.4	E
I-4 EB off-ramp	II	35	14.7	12.6	27.3	0.12	15.5	E
US 92	II	35	38.8	32.0	70.8	0.36	18.2	D
Total	II		83.8	81.5	165.3	0.78	17.0	D

With Additional US 92 Intersection
Improvements

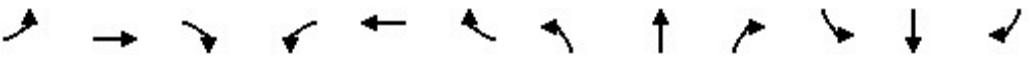
HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd/Marathon Gas

Intersection													
Int Delay, s/veh	18.5												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	9	4	57	64	3	8	16	217	436	72	24	758	8
Future Vol, veh/h	9	4	57	64	3	8	16	217	436	72	24	758	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	9	4	60	67	3	8	17	228	459	76	25	798	8
Major/Minor	Minor2		Minor1		Major1		Major2						
Conflicting Flow All	1573	1877	403	1438	1843	268	806	806	0	0	535	0	0
Stage 1	852	852	-	987	987	-	-	-	-	-	-	-	-
Stage 2	721	1025	-	451	856	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.6	7	7.6	6.6	7	6.5	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4.05	3.35	3.55	4.05	3.35	2.55	2.25	-	-	2.25	-	-
Pot Cap-1 Maneuver	72	68	589	91	72	721	432	795	-	-	1008	-	-
Stage 1	314	367	-	260	317	-	-	-	-	-	-	-	-
Stage 2	378	304	-	550	366	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-		-	-
Mov Cap-1 Maneuver	49	44	589	~ 55	46	721	742	742	-	-	1008	-	-
Mov Cap-2 Maneuver	49	44	-	~ 55	46	-	-	-	-	-	-	-	-
Stage 1	210	350	-	174	212	-	-	-	-	-	-	-	-
Stage 2	247	204	-	466	350	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB						
HCM Control Delay, s	36		\$ 337.5		3.8		0.5						
HCM LOS	E		F										
Minor Lane/Major Mvmt	NBL		NBT	NBR	EBLn1WBLn1		SBL	SBT	SBR				
Capacity (veh/h)	742		-	-	188	60	1008	-	-				
HCM Lane V/C Ratio	0.331		-	-	0.392	1.316	0.025	-	-				
HCM Control Delay (s)	12.2		-	-	36	\$ 337.5	8.7	0.2	-				
HCM Lane LOS	B		-	-	E	F	A	A	-				
HCM 95th %tile Q(veh)	1.4		-	-	1.7	6.8	0.1	-	-				
Notes													
~: Volume exceeds capacity		\$: Delay exceeds 300s				+: Computation Not Defined				*: All major volume in platoon			

HCM Signalized Intersection Capacity Analysis

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	264	13	383	1083	358	0	0	543	352
Future Volume (vph)	0	0	0	264	13	383	1083	358	0	0	543	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Lane Util. Factor				0.95	0.95	1.00	0.97	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.94	
Flt Protected				0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1633	1645	1538	3335	3438			3235	
Flt Permitted				0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1633	1645	1538	3335	3438			3235	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	278	14	403	1140	377	0	0	572	371
RTOR Reduction (vph)	0	0	0	0	0	329	0	0	0	0	81	0
Lane Group Flow (vph)	0	0	0	145	147	74	1140	377	0	0	862	0
Turn Type				Perm	NA	Perm	Prot	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				24.0	24.0	24.0	47.6	94.0			40.4	
Effective Green, g (s)				24.0	24.0	24.0	47.6	94.0			40.4	
Actuated g/C Ratio				0.18	0.18	0.18	0.37	0.72			0.31	
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				301	303	283	1221	2485			1005	
v/s Ratio Prot							c0.34	0.11			c0.27	
v/s Ratio Perm				0.09	0.09	0.05						
v/c Ratio				0.48	0.49	0.26	0.93	0.15			0.86	
Uniform Delay, d1				47.4	47.5	45.4	39.7	5.6			42.1	
Progression Factor				1.00	1.00	1.00	0.40	0.57			1.00	
Incremental Delay, d2				5.4	5.5	2.3	11.9	0.1			9.4	
Delay (s)				52.9	52.9	47.7	27.8	3.3			51.5	
Level of Service				D	D	D	C	A			D	
Approach Delay (s)		0.0			49.9			21.7			51.5	
Approach LOS		A			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			36.8				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			80.5%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	9	800	0	0	0	0	1320	559	150	657	0
Future Volume (vph)	121	9	800	0	0	0	0	1320	559	150	657	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0					6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00	0.88					0.86	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1729	2707					6225	1538	1719	3438	
Flt Permitted		0.96	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1729	2707					6225	1538	1719	3438	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	127	9	842	0	0	0	0	1389	588	158	692	0
RTOR Reduction (vph)	0	0	308	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	136	534	0	0	0	0	1389	588	158	692	0
Turn Type	Perm	NA	Prot					NA	Free	Prot	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4								Free			
Actuated Green, G (s)		32.3	32.3					63.0	130.0	16.7	85.7	
Effective Green, g (s)		32.3	32.3					63.0	130.0	16.7	85.7	
Actuated g/C Ratio		0.25	0.25					0.48	1.00	0.13	0.66	
Clearance Time (s)		6.0	6.0					6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		429	672					3016	1538	220	2266	
v/s Ratio Prot			c0.20					c0.22		c0.09	0.20	
v/s Ratio Perm		0.08							0.38			
v/c Ratio		0.32	0.79					0.46	0.38	0.72	0.31	
Uniform Delay, d1		39.9	45.7					22.2	0.0	54.4	9.5	
Progression Factor		1.00	1.00					0.93	1.00	0.37	0.46	
Incremental Delay, d2		0.4	6.4					0.2	0.3	5.3	0.2	
Delay (s)		40.3	52.2					21.0	0.3	25.4	4.6	
Level of Service		D	D					C	A	C	A	
Approach Delay (s)		50.5			0.0			14.8			8.5	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		22.6			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			18.0				
Intersection Capacity Utilization		80.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕	↗		↕	
Traffic Vol, veh/h	0	0	148	0	0	100	0	1779	102	0	1404	53
Future Vol, veh/h	0	0	148	0	0	100	0	1779	102	0	1404	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	156	0	0	105	0	1873	107	0	1478	56
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	767	-	-	937	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.35	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	345	0	0	260	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	345	-	-	260	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	23.7		28		0		0					
HCM LOS	C		D									
Minor Lane/Major Mvmt	NBT		NBR EBLn1WBLn1		SBT		SBR					
Capacity (veh/h)	-		345 260		-		-					
HCM Lane V/C Ratio	-		0.452 0.405		-		-					
HCM Control Delay (s)	-		23.7 28		-		-					
HCM Lane LOS	-		C D		-		-					
HCM 95th %tile Q(veh)	-		2.3 1.9		-		-					

HCM 6th TWSC
20: Branch Forbes Rd & Keene Dr

Intersection							
Int Delay, s/veh	16.8						
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	12	10	17	1727	142	1400	10
Future Vol, veh/h	12	10	17	1727	142	1400	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	150	-	150	-	-
Veh in Median Storage, #	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5
Mvmt Flow	13	11	18	1818	149	1474	11
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	2723	743	1485	0	1818	-	0
Stage 1	1778	-	-	-	-	-	-
Stage 2	945	-	-	-	-	-	-
Critical Hdwy	6.9	7	4.2	-	6.5	-	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-	-
Follow-up Hdwy	3.55	3.35	2.25	-	2.55	-	-
Pot Cap-1 Maneuver	16	351	434	-	~ 94	-	-
Stage 1	117	-	-	-	-	-	-
Stage 2	331	-	-	-	-	-	-
Platoon blocked, %				-		-	-
Mov Cap-1 Maneuver	0	351	434	-	~ 94	-	-
Mov Cap-2 Maneuver	0	-	-	-	-	-	-
Stage 1	112	-	-	-	-	-	-
Stage 2	0	-	-	-	-	-	-
Approach	EB	NB		SB			
HCM Control Delay, s	16	0.1		35.5			
HCM LOS	C						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR	
Capacity (veh/h)	434	-	351	~ 94	-	-	
HCM Lane V/C Ratio	0.041	-	0.066	1.59	-	-	
HCM Control Delay (s)	13.7	-	16	388.3	-	-	
HCM Lane LOS	B	-	C	F	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	11.7	-	-	
Notes							
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM Signalized Intersection Capacity Analysis

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	486	32	46	755	739	81	713	16	508	550	352
Future Volume (vph)	292	486	32	46	755	739	81	713	16	508	550	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	7.3		6.8	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3335	3406		1719	3438	1538	1719	3427		3335	3438	1538
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3335	3406		1719	3438	1538	1719	3427		3335	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	307	512	34	48	795	778	85	751	17	535	579	371
RTOR Reduction (vph)	0	3	0	0	0	79	0	2	0	0	0	65
Lane Group Flow (vph)	307	543	0	48	795	699	85	766	0	535	579	306
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	1	6		5	2	3	7	4		3	8	1
Permitted Phases						2						8
Actuated Green, G (s)	14.0	39.3		7.0	32.3	61.1	13.0	27.0		28.8	42.6	56.6
Effective Green, g (s)	14.0	39.3		7.0	32.3	61.1	13.0	27.0		28.8	42.6	56.6
Actuated g/C Ratio	0.11	0.30		0.05	0.25	0.47	0.10	0.21		0.22	0.33	0.44
Clearance Time (s)	6.8	7.3		6.8	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Vehicle Extension (s)	3.0	3.5		3.0	3.5	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	359	1029		92	854	722	171	711		738	1126	669
v/s Ratio Prot	c0.09	c0.16		0.03	0.23	c0.21	0.05	c0.22		0.16	0.17	0.05
v/s Ratio Perm						0.24						0.15
v/c Ratio	0.86	0.53		0.52	0.93	0.97	0.50	1.08		0.72	0.51	0.46
Uniform Delay, d1	57.0	37.6		59.9	47.8	33.5	55.4	51.5		46.9	35.3	25.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.73	0.78	1.21
Incremental Delay, d2	17.7	0.6		5.3	16.7	25.7	2.3	56.7		5.5	1.5	0.4
Delay (s)	74.7	38.2		65.1	64.4	59.2	57.7	108.2		39.6	29.1	31.7
Level of Service	E	D		E	E	E	E	F		D	C	C
Approach Delay (s)		51.3			61.9			103.2			33.5	
Approach LOS		D			E			F			C	
Intersection Summary												
HCM 2000 Control Delay	58.6			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	0.98											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			28.1					
Intersection Capacity Utilization	91.5%			ICU Level of Service			F					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp



Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	145	147	403	1140	377	943
v/c Ratio	0.48	0.49	0.66	0.93	0.15	0.87
Control Delay	53.6	53.6	10.0	29.6	3.3	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	53.6	10.0	29.6	3.3	47.0
Queue Length 50th (ft)	116	117	0	478	40	358
Queue Length 95th (ft)	189	192	96	#598	2	#479
Internal Link Dist (ft)		1859			540	265
Turn Bay Length (ft)	500		1000			
Base Capacity (vph)	301	303	612	1257	2485	1085
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.49	0.66	0.91	0.15	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	136	842	1389	588	158	692
v/c Ratio	0.32	0.86	0.46	0.38	0.72	0.31
Control Delay	39.9	32.3	22.7	0.3	29.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	32.3	22.7	0.3	29.1	5.1
Queue Length 50th (ft)	93	210	263	0	80	90
Queue Length 95th (ft)	138	276	m311	m0	m119	m184
Internal Link Dist (ft)	1782		300			540
Turn Bay Length (ft)		840			260	
Base Capacity (vph)	558	1152	3016	1538	277	2265
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.73	0.46	0.38	0.57	0.31
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Queues

14: Branch Forbes Rd & US 92



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	546	48	795	778	85	768	535	579	371
v/c Ratio	0.86	0.53	0.43	0.97	0.89	0.50	1.08	0.69	0.50	0.49
Control Delay	79.0	40.6	70.6	75.1	35.4	66.1	104.5	38.0	28.3	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.0	40.6	70.6	75.1	35.4	66.1	104.5	38.0	28.3	13.1
Queue Length 50th (ft)	132	207	39	352	482	69	~378	197	203	145
Queue Length 95th (ft)	#208	268	82	#487	#774	126	#508	261	254	229
Internal Link Dist (ft)		2145		2346			476		1019	
Turn Bay Length (ft)	475		325		650	150		525		500
Base Capacity (vph)	364	1032	121	816	879	171	713	774	1163	754
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.53	0.40	0.97	0.89	0.50	1.08	0.69	0.50	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Arterial Level of Service

Arterial Level of Service: NB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 92	II	45	21.1	104.5	125.6	0.19	5.6	F
I-4 EB on-ramp	II	35	38.8	22.7	61.5	0.36	21.0	D
I-4 WB off-ramp	II	35	14.7	3.3	18.0	0.12	23.5	C
Total	II		74.6	130.5	205.1	0.67	11.8	F

Arterial Level of Service: SB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-4 WB on-ramp	II	42	31.2	47.0	78.2	0.31	14.1	E
I-4 EB off-ramp	II	35	14.7	5.1	19.8	0.12	21.3	D
US 92	II	35	38.8	28.3	67.1	0.36	19.3	D
Total	II		84.7	80.4	165.1	0.78	17.1	D

HCM 6th TWSC

2: Branch Forbes Rd & Harvey Tew Rd/Marathon Gas

Intersection													
Int Delay, s/veh	18.5												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	9	4	57	64	3	8	16	217	436	72	24	758	8
Future Vol, veh/h	9	4	57	64	3	8	16	217	436	72	24	758	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	9	4	60	67	3	8	17	228	459	76	25	798	8
Major/Minor	Minor2		Minor1			Major1			Major2				
Conflicting Flow All	1573	1877	403	1438	1843	268	806	806	0	0	535	0	0
Stage 1	852	852	-	987	987	-	-	-	-	-	-	-	-
Stage 2	721	1025	-	451	856	-	-	-	-	-	-	-	-
Critical Hdwy	7.6	6.6	7	7.6	6.6	7	6.5	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	5.6	-	6.6	5.6	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.55	4.05	3.35	3.55	4.05	3.35	2.55	2.25	-	-	2.25	-	-
Pot Cap-1 Maneuver	72	68	589	91	72	721	432	795	-	-	1008	-	-
Stage 1	314	367	-	260	317	-	-	-	-	-	-	-	-
Stage 2	378	304	-	550	366	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-		-	-
Mov Cap-1 Maneuver	49	44	589	~ 55	46	721	742	742	-	-	1008	-	-
Mov Cap-2 Maneuver	49	44	-	~ 55	46	-	-	-	-	-	-	-	-
Stage 1	210	350	-	174	212	-	-	-	-	-	-	-	-
Stage 2	247	204	-	466	350	-	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB				
HCM Control Delay, s	36		\$ 337.5			3.8			0.5				
HCM LOS	E		F										
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR						
Capacity (veh/h)	742	-	-	188	60	1008	-	-					
HCM Lane V/C Ratio	0.331	-	-	0.392	1.316	0.025	-	-					
HCM Control Delay (s)	12.2	-	-	36\$	337.5	8.7	0.2	-					
HCM Lane LOS	B	-	-	E	F	A	A	-					
HCM 95th %tile Q(veh)	1.4	-	-	1.7	6.8	0.1	-	-					
Notes													
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined			*: All major volume in platoon					

HCM Signalized Intersection Capacity Analysis

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	473	4	353	634	451	0	0	484	149
Future Volume (vph)	0	0	0	473	4	353	634	451	0	0	484	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Lane Util. Factor				0.95	0.95	1.00	0.97	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.96	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1633	1638	1538	3335	3438			3317	
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (perm)				1633	1638	1538	3335	3438			3317	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	498	4	372	667	475	0	0	509	157
RTOR Reduction (vph)	0	0	0	0	0	271	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	249	253	101	667	475	0	0	647	0
Turn Type				Perm	NA	Perm	Prot	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8		8						
Actuated Green, G (s)				38.0	38.0	38.0	33.6	90.0			50.4	
Effective Green, g (s)				38.0	38.0	38.0	33.6	90.0			50.4	
Actuated g/C Ratio				0.27	0.27	0.27	0.24	0.64			0.36	
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)				443	444	417	800	2210			1194	
v/s Ratio Prot							c0.20	0.14			c0.20	
v/s Ratio Perm				0.15	0.15	0.07						
v/c Ratio				0.56	0.57	0.24	0.83	0.21			0.54	
Uniform Delay, d1				43.8	44.0	39.8	50.5	10.4			35.6	
Progression Factor				1.00	1.00	1.00	0.36	0.69			1.00	
Incremental Delay, d2				5.1	5.2	1.4	7.0	0.2			1.8	
Delay (s)				48.9	49.2	41.1	25.4	7.4			37.3	
Level of Service				D	D	D	C	A			D	
Approach Delay (s)		0.0			45.7			17.9			37.3	
Approach LOS		A			D			B			D	
Intersection Summary												
HCM 2000 Control Delay			31.8				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			140.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			68.0%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	6	1006	0	0	0	0	906	526	133	824	0
Future Volume (vph)	179	6	1006	0	0	0	0	906	526	133	824	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0					6.0	4.0	6.0	6.0	
Lane Util. Factor		1.00	0.88					0.86	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1726	2707					6225	1538	1719	3438	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1726	2707					6225	1538	1719	3438	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	188	6	1059	0	0	0	0	954	554	140	867	0
RTOR Reduction (vph)	0	0	123	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	194	936	0	0	0	0	954	554	140	867	0
Turn Type	Perm	NA	Perm					NA	Free	Prot	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4						Free			
Actuated Green, G (s)		53.8	53.8					54.4	140.0	13.8	74.2	
Effective Green, g (s)		53.8	53.8					54.4	140.0	13.8	74.2	
Actuated g/C Ratio		0.38	0.38					0.39	1.00	0.10	0.53	
Clearance Time (s)		6.0	6.0					6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		663	1040					2418	1538	169	1822	
v/s Ratio Prot								0.15		c0.08	c0.25	
v/s Ratio Perm		0.11	c0.35						0.36			
v/c Ratio		0.29	0.90					0.39	0.36	0.83	0.48	
Uniform Delay, d1		29.9	40.6					30.9	0.0	61.9	20.7	
Progression Factor		1.00	1.00					0.88	1.00	0.50	0.61	
Incremental Delay, d2		0.2	10.4					0.3	0.5	23.7	0.7	
Delay (s)		30.1	51.0					27.6	0.5	54.4	13.4	
Level of Service		C	D					C	A	D	B	
Approach Delay (s)		47.8			0.0			17.6			19.1	
Approach LOS		D			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			28.0		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			140.0		Sum of lost time (s)					18.0		
Intersection Capacity Utilization			68.0%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC

7: Branch Forbes Rd & Glen Harwell Rd/Beauchamp Rd

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕	↗		↕	
Traffic Vol, veh/h	0	0	148	0	0	100	0	1779	102	0	1404	53
Future Vol, veh/h	0	0	148	0	0	100	0	1779	102	0	1404	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	0	156	0	0	105	0	1873	107	0	1478	56
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	767	-	-	937	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.35	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	345	0	0	260	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	345	-	-	260	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	23.7		28		0		0					
HCM LOS	C		D									
Minor Lane/Major Mvmt	NBT		NBR EBLn1WBLn1		SBT		SBR					
Capacity (veh/h)	-		345 260		-		-					
HCM Lane V/C Ratio	-		0.452 0.405		-		-					
HCM Control Delay (s)	-		23.7 28		-		-					
HCM Lane LOS	-		C D		-		-					
HCM 95th %tile Q(veh)	-		2.3 1.9		-		-					

HCM 6th TWSC
20: Branch Forbes Rd & Keene Dr

Intersection							
Int Delay, s/veh	16.8						
Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	12	10	17	1727	142	1400	10
Future Vol, veh/h	12	10	17	1727	142	1400	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	150	-	150	-	-
Veh in Median Storage, #	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	5	5	5	5
Mvmt Flow	13	11	18	1818	149	1474	11
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	2723	743	1485	0	1818	-	0
Stage 1	1778	-	-	-	-	-	-
Stage 2	945	-	-	-	-	-	-
Critical Hdwy	6.9	7	4.2	-	6.5	-	-
Critical Hdwy Stg 1	5.9	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	-	-	-	-	-	-
Follow-up Hdwy	3.55	3.35	2.25	-	2.55	-	-
Pot Cap-1 Maneuver	16	351	434	-	~ 94	-	-
Stage 1	117	-	-	-	-	-	-
Stage 2	331	-	-	-	-	-	-
Platoon blocked, %				-		-	-
Mov Cap-1 Maneuver	0	351	434	-	~ 94	-	-
Mov Cap-2 Maneuver	0	-	-	-	-	-	-
Stage 1	112	-	-	-	-	-	-
Stage 2	0	-	-	-	-	-	-
Approach	EB	NB		SB			
HCM Control Delay, s	16	0.1		35.5			
HCM LOS	C						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBU	SBT	SBR	
Capacity (veh/h)	434	-	351	~ 94	-	-	
HCM Lane V/C Ratio	0.041	-	0.066	1.59	-	-	
HCM Control Delay (s)	13.7	-	16	388.3	-	-	
HCM Lane LOS	B	-	C	F	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.2	11.7	-	-	
Notes							
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM Signalized Intersection Capacity Analysis

14: Branch Forbes Rd & US 92

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	697	104	109	508	593	82	517	32	693	762	277
Future Volume (vph)	239	697	104	109	508	593	82	517	32	693	762	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3335	3371		1719	3438	1538	1719	3408		3335	3438	1538
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3335	3371		1719	3438	1538	1719	3408		3335	3438	1538
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	252	734	109	115	535	624	86	544	34	729	802	292
RTOR Reduction (vph)	0	8	0	0	0	68	0	3	0	0	0	78
Lane Group Flow (vph)	252	835	0	115	535	556	86	575	0	729	802	214
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	1	6		5	2	3	7	4		3	8	1
Permitted Phases						2						8
Actuated Green, G (s)	15.2	37.1		11.4	33.8	71.9	13.0	25.0		38.1	49.9	65.1
Effective Green, g (s)	15.2	37.1		11.4	33.8	71.9	13.0	25.0		38.1	49.9	65.1
Actuated g/C Ratio	0.11	0.27		0.08	0.24	0.51	0.09	0.18		0.27	0.36	0.46
Clearance Time (s)	6.8	7.3		7.3	7.3	6.8	7.0	7.0		6.8	7.0	6.8
Vehicle Extension (s)	3.0	3.5		3.0	3.5	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	362	893		139	830	789	159	608		907	1225	715
v/s Ratio Prot	0.08	c0.25		0.07	0.16	c0.19	0.05	c0.17		c0.22	0.23	0.03
v/s Ratio Perm						0.17						0.11
v/c Ratio	0.70	0.93		0.83	0.64	0.71	0.54	0.95		0.80	0.65	0.30
Uniform Delay, d1	60.2	50.3		63.3	47.7	26.0	60.6	56.8		47.5	37.8	23.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.70	0.71	1.19
Incremental Delay, d2	5.7	16.7		31.4	1.8	3.0	3.7	25.2		5.8	2.1	0.2
Delay (s)	65.9	66.9		94.8	49.5	29.0	64.4	82.1		39.1	29.1	28.0
Level of Service	E	E		F	D	C	E	F		D	C	C
Approach Delay (s)		66.7			43.5			79.8			32.9	
Approach LOS		E			D			E			C	
Intersection Summary												
HCM 2000 Control Delay			49.7									
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			140.0									
Intersection Capacity Utilization			87.4%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Branch Forbes Rd & I-4 WB on-ramp/I-4 WB off-ramp



Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	145	147	403	1140	377	943
v/c Ratio	0.48	0.49	0.66	0.93	0.15	0.87
Control Delay	53.6	53.6	10.0	29.6	3.3	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	53.6	10.0	29.6	3.3	47.0
Queue Length 50th (ft)	116	117	0	478	40	358
Queue Length 95th (ft)	189	192	96	#598	2	#479
Internal Link Dist (ft)		1859			540	265
Turn Bay Length (ft)	500		1000			
Base Capacity (vph)	301	303	612	1257	2485	1085
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.49	0.66	0.91	0.15	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

8: Branch Forbes Rd & I-4 EB off-ramp/I-4 EB on-ramp

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	136	842	1389	588	158	692
v/c Ratio	0.32	0.86	0.46	0.38	0.72	0.31
Control Delay	39.9	32.3	22.7	0.3	29.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	32.3	22.7	0.3	29.1	5.1
Queue Length 50th (ft)	93	210	263	0	80	90
Queue Length 95th (ft)	138	276	m311	m0	m119	m184
Internal Link Dist (ft)	1782		300			540
Turn Bay Length (ft)		840			260	
Base Capacity (vph)	558	1152	3016	1538	277	2265
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.73	0.46	0.38	0.57	0.31
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Queues

14: Branch Forbes Rd & US 92

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	546	48	795	778	85	768	535	579	371
v/c Ratio	0.86	0.53	0.43	0.97	0.89	0.50	1.08	0.69	0.50	0.49
Control Delay	79.0	40.6	70.6	75.1	35.4	66.1	104.5	38.0	28.3	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.0	40.6	70.6	75.1	35.4	66.1	104.5	38.0	28.3	13.1
Queue Length 50th (ft)	132	207	39	352	482	69	~378	197	203	145
Queue Length 95th (ft)	#208	268	82	#487	#774	126	#508	261	254	229
Internal Link Dist (ft)		2145		2346			476		1019	
Turn Bay Length (ft)	475		325		650	150		525		500
Base Capacity (vph)	364	1032	121	816	879	171	713	774	1163	754
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.53	0.40	0.97	0.89	0.50	1.08	0.69	0.50	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Arterial Level of Service

Arterial Level of Service: NB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 92	II	45	21.1	104.5	125.6	0.19	5.6	F
I-4 EB on-ramp	II	35	38.8	22.7	61.5	0.36	21.0	D
I-4 WB off-ramp	II	35	14.7	3.3	18.0	0.12	23.5	C
Total	II		74.6	130.5	205.1	0.67	11.8	F

Arterial Level of Service: SB Branch Forbes Rd

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-4 WB on-ramp	II	42	31.2	47.0	78.2	0.31	14.1	E
I-4 EB off-ramp	II	35	14.7	5.1	19.8	0.12	21.3	D
US 92	II	35	38.8	28.3	67.1	0.36	19.3	D
Total	II		84.7	80.4	165.1	0.78	17.1	D

APPENDIX F CMF 7566



CRASH MODIFICATION FACTORS CLEARINGHOUSE

CMF / CRF DETAILS

CMF ID: 7566

CONVERT 2 LANE ROADWAY TO 4 LANE DIVIDED ROADWAY

DESCRIPTION: CONVERSION OF URBAN AND RURAL TWO-LANE ROADWAYS TO FOUR-LANE DIVIDED ROADWAYS

PRIOR CONDITION: 2 LANE ROADWAY

CATEGORY: ROADWAY

STUDY: [EVALUATION OF THE SAFETY EFFECTIVENESS OF THE CONVERSION OF TWO-LANE ROADWAYS TO FOUR-LANE DIVIDED ROADWAYS: BAYESIAN VS. EMPIRICAL BAYES, AHMED ET AL., 2015](#)

Star Quality Rating: [\[VIEW SCORE DETAILS\]](#)

Rating Points Total: 120

Crash Modification Factor (CMF)

Value: 0.341

Adjusted Standard Error:

Unadjusted Standard Error: 0.091

Crash Reduction Factor (CRF)

Value: 65.88 *(This value indicates a decrease in crashes)*

Adjusted Standard Error:

Unadjusted Standard Error: 9.05

Applicability

Crash Type: All

Crash Severity: All

Roadway Types: Not specified

Street Type:

Minimum Number of Lanes: 2

Maximum Number of Lanes: 2

Number of Lanes Direction:

Number of Lanes Comment:

Crash Weather: Not specified

Road Division Type: Undivided

Minimum Speed Limit:

Maximum Speed Limit:

Speed Unit:	
Speed Limit Comment:	
Area Type:	Urban
Traffic Volume:	
Average Traffic Volume:	18544 Annual Average Daily Traffic (AADT)
Time of Day:	All
	<i>If countermeasure is intersection-based</i>
Intersection Type:	
Intersection Geometry:	
Traffic Control:	
Major Road Traffic Volume:	
Minor Road Traffic Volume:	
Average Major Road Volume :	
Average Minor Road Volume :	
	Development Details
Date Range of Data Used:	2002 to 2012
Municipality:	
State:	FL
Country:	USA
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size (crashes):	69 crashes before, 30 crashes after
Sample Size (sites):	41 sites before, 41 sites after
Sample Size (miles):	8.578 miles before, 8.578 miles after
	Other Details
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Nov-01-2015
Comments:	

[VIEW THE FULL STUDY DETAILS](#)
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For more information, contact Karen Scurry at karen.scurry@dot.gov

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